NDD

October 1999

Electronics Australia

with PROFESSIONAL ELECTRONICS & ETI
www.electronicsaustralia.com.au

GET YOURSELF on the NET!

Setting up the EA webcam

SMPTE Show

Soldering iron roundup

THX in your living room

Internet on a chip

$5.95 NZ $7.50 (inc GST)
10
9 312966 123633
Print Post Approved PP255003/01056

"Simply...the best performance and value for money available!"

Signature
SURROUND PACKAGE

"One could be forgiven for thinking that these speakers were 10 times the price...The stereo imaging was truly outstanding...The VAF Signature I-51 system has one of the finest high frequency responses of any
Electronics Australia

"Are these the best kit speakers in the world?...On the evidence, we'd have to say that VAF's I-66 design would be odds on favourite to take out the award."
Best Buys Speakers, Amplifiers, Receivers

"... don't think there's any other way you could obtain this high level of sound quality at such a low price..."
Australian Hi-Fi

"A new benchmark in excellence in every criteria: construction, design, finish, innovation."
Best Buys Home Theatre '97 '98

"Highly and unreservedly recommended."
Best Buys Home Theatre

"... In value for money stakes or even sound for dollar stakes for that matter, they're nigh on impossible to beat."
Australian Hi-Fi

"We love the DC-Xs. These are true high fidelity speakers, and deserve a pedigree second to none. we are confident that that will be the case in time. Their performance is a revelation. The combination of the DC-Xs, the DC-6 and DC-2s is a happy, fully compatible, articulate and balanced system that beats anything we can think of in its price range. Actually,probably close to twice its price range."
Best Buys Home Theatre '98 '99

"The VAF DC-Series home theatre system exhibits a new benchmark of excellence in every criteria: construction, design finish , innovation...it seems almost churlish to mention the astounding value that each of these components represents."
Best Buys Home Theatre

"All areas of the DC-X's performance could easily be attributed to models costing a great deal more...The very design of the DC-x sets a few new standards in speaker engineering, some of which help it achieve incredible levels of versatility across amplifiers and source products and Home Theatre applications...Amazing value!"
Audio Video Lifestyle Magazine

"Unmatched performance at the price.The new DC-2 significantly raises the standard by which speakers at its price will be measured. This speaker is destined to become a classic."

INNOVATION 20 Years DEVELOPMENT

VAF RESEARCH

hear IT see IT feel IT REALITY

Speakers For Audiophile Purists or Home Theatre Extremists
12 Models Either Fully Assembled or As Ready To Assemble Kits.

For information further contact us on:
FREECALL 1800 818 882
www.VAF.com.au.

DC series Signature series Home Theatre solutions

VAF Research Pty Ltd. 52-54 Nth Terrace, Kent Town S.A. 5067 Phone: (08) 8269 4446 Fax: (08) 8269 4460 Internet: www.VAF.com.au e-mail: vaf@vaf.com.au

Australia's largest selling electronics magazine — Established in 1922

Electronics Australia

with PROFESSIONAL ELECTRONICS & ETI

October 1999 Volume 61, No.10 www.electronicsaustralia.com.au

World of Electronics

Projects and Technical

Columns and Comments

Departments

On the cover

Putting yourself on the net couldn't be easier, as our cover model Laura Munodawafa demostrates.

See how we set up the EA webcam in our review of Logitech's QuickCam Pro, which you'll find on page 18 (Photo by Michael Pugh)

Put yourself on the net

18

Want to be famous? Put yourself on the net! We thought we'd set up a webcam here at EA, and it turned out to be a lot easier than we thought...

Find that PC problem

26

This POST Card works in ISA, EISA and PCI slots, and tells you what's wrong with your PC. Handy, that...

Pioneer's VSX-D906S

10

Pioneer's new 5-channel receiver gives you 100W of THX and Dolby Digital sound, as well as Dolby Pro-Logic analogue decoding.

Professional Electronics

MANAGING EDITOR
Graham Cattley
TECHNICAL EDITOR
Rob Evans, CET (RMIT)
PRODUCTION EDITOR
Witold Budzynski, B.Sc.
CONTRIBUTING EDITOR
Jamieson Rowe, B.A., B.Sc., SMIREE, VK2ZLO
CONTRIBUTORS
Jean-Baptiste Cattley
Roger Johnson, VK5ZKP
Jim Lawler, MTETIA
Tom Moffat, VK7TM
Peter Phillips, B.Ed., Dip Ed., ECC
READER SERVICES CO-ORDINATOR
Ana Marie Zamora; phone (02) 9353 0620
email: elt@fpc.com.au
DRAFTING
Jean-Baptiste Cattley
ADVERTISING MANAGER
Jon Lesjak; phone (02) 9353 0734
ADVERTISING PRODUCTION
Pamela Sceats; phone (02) 9353 0629
PRODUCTION MANAGER
Brett Baker
CIRCULATION MANAGER
Michael Prior
EDITORIAL DIRECTOR
Christine Whiston
NATIONAL SALES DIRECTOR
Rick Nicholson
GENERAL MANAGER
Geoff Baggett
HEAD OFFICE
PO Box 199, Alexandria 1435.
180 Bourke Road, Alexandria 2015.
Phone (02) 9353 0620; fax (02) 9353 0613
E-mail: electaus@fpc.com.au
Web site: www.electronicsaustralia.com.au
Computer Bulletin Board: (02) 9353 0627
Subscriptions Enquiries:
phone (02) 9353 9992; fax (02) 9353 0967.

INTERSTATE ADVERTISING SALES
MELBOURNE: Kayren Browne
Level 8, 492 St Kilda Road, Melbourne 3004.
Phone (03) 9864 1222; fax (03) 9864 1211.
BRISBANE: Graham Smith
26 Chermside Street, Newstead 4006.
Phone (07) 3854 1119; fax (07) 3252 3692.
ADELAIDE: Sue Bowshall
98 Jervois Street, Torrensville, 5031.
Phone (08) 8352 7937; fax (08) 8352 6033.
PERTH: JWP Media Specialists
416 Canning Highway, Como 6152.
Phone (08) 9450 3200; fax (08) 9450 3211.

ELECTRONICS AUSTRALIA is published by FPC Magazines, a division of Eastern Suburbs Newspapers Partnership, which is owned by General Newspapers Pty Ltd.
A.C.N.000 117 322,
Double Bay Newspapers Pty Ltd.
A.C.N.000 237 598, and
Brehmer Fairfax Pty Ltd.
A.C.N.008 629 767,
180 Bourke Road, Alexandria, NSW 2015.
Copyright © 1999 by FPC Magazines, Sydney. All rights reserved. No part of this publication may be reproduced in any way without written permission from the General Manager or Managing Editor.
Printed by Macquarie Print, 51 - 59 Wheelers Lane, Dubbo 2830. Phone (02) 68 843 444.
Distributed by Newsagents Direct Distribution Pty Ltd, 150 Bourke Rd, Alexandria 2015; phone (02) 9353 9911.
ISSN 1328-6218
* Recommended & maximum Australian retail price.

Member of the Audit Bureau of Circulations

Letters to the Editor

Nitinol source

I was very interested to read your article on muscle wires and their use in robotics. Readers may be interested to know of another very common use of these metals. There is every chance that the teenager sitting across from you at the dinner table will exhibit 80 to 160mm of muscle wire next time he or she can be induced to smile.

I am referring to the fact that orthodontists have used Nitinol archwires with braces for about 20 years. Nitinol, or more correctly nickel-titanium alloy, since the word Nitinol is a brand derived as an acronym of the 2 metals and the North American Ordnance Laboratory which first produced it, is most commonly used in 2 forms in orthodontics. The first is an alloy with a low transition temperature, which maintains its pre-formed shape in the mouth, and is useful because of its resiliency and low force characteristics. The second has a transition temperature above room temperature. It is dead soft for easy insertion into the slots of orthodontic brackets, but is activated at mouth temperature to resume its preformed shape.

A practical consideration for model builders may be that orthodontic archwires frequently have to be shortened by 25 to 30mm to fit the patient's mouth, the cutoff pieces being discarded. Although such pieces are very short, most are rectangular in cross-section and the ingenious could probably make use of the torsional activation effects if activated by a current. I am sure any orthodontist using this type of wire would not mind saving the unused portions if asked to.

Christopher.C.Miles, via email

DVD won't play CD-R VCDs

I read your preview of the Philips DVD 725 in July's EA and the full review in the August issue. I ran out after the first article to find this machine. I have a Video Studio that produces amongst other things VCDs for DJs and nightclub video systems, and I've been waiting for a cheaper CD-R compatible player so I can test VCD-Rs and play all my other disc types on the one unit. The added bonus of DTS on the DVD 725 and a great price was the clincher for me.

I picked up the machine, took it home, put in a VCD-R Disc and... It wouldn't play properly! It stops every 5 to 10 seconds and freezes momentarily. I returned the player, and tried my disc into the Store's demo unit on display. Same thing -- the unit freezes up and stutters. I took the disc to another home cinema retailer and checked it in the multi-$1000 Sony DVP-S7700. The disc played flawlessly as it does on all my VCD players. So I don't believe my production methods are at fault.

Philips have missed the mark this time. When I contacted their technical department, they bluntly told me that the unit makes no claim to play anything other than Audio disc CD-Rs. Why the unit won't play VCD-Rs is a mystery. I think they have overlooked this obvious (to us) CD-R type as Creative did when they released the DVD-ROM. Creative fixed the problem on later models, lets hope Philips does the same.

Doesn't say much though from the company that co-invented all this!

Kevin Attwood, via email

Comment: The review unit DID play a number of audio CDRs, and one video CDR that we had made, so I think the situation is rather cloudy...

DVD zoning dead?

There's been a lot said lately about the zoning of DVDs. There's nothing new about this and I think that it will suffer the same fate as all the others: In 1924 when broadcasting was born, Australia introduced the sealed set era. Radios were sold sealed to only receive one station with the attendant license fees. That was total disaster.

Then what about the IBM PS2 computer designed to retrieve market dominance? The market said "No Thanks".

I think DVD zoning is dead already.

Don Black, via email

Can cats see IR?

I couldn't help to send you this strange find. I was just rotating the jog/shuttle wheel on the remote control for my VCR the other day, and found that one of my cats was staring at the controller with great interest. Why? I don't know.

I then pressed some other buttons and

the cat made a high-pitched whine and then ran for the door! Just to check that that particular cat wasn't mucking around, I did it to the other cat — and it too reacted similarly.

Do all cats have sensitivity to infra-red light, or is it just *my* cats? Perhaps the army should adopt one of my cats for their military training exercises!

Logan Squires, Gawler SA.

LP book review

I would like to draw your attention to a review written by Jim Rowe in the July issue of *Electronics Australia*. The review is on a book titled *The LP is Back*, published by Audio Express.

Jaycar Electronics is the Australian distributor for Audio Express and after careful consideration decided against distributing this particular book. I am sure you are aware that Jaycar carries quite a number of books, all listed in our latest catalogue. We would be more than happy to make any of these available to you for review, on request.

John Maley, Marketing Manager
Jaycar Electronics, Rhodes NSW

Comment: The book was sent to our office for review by Audio Express, John, and we reviewed it because we felt a significant number of readers would find it of interest. Presumably those who do want a copy can buy it direct since Jaycar isn't stocking it.

Help wanted

I am an electrical engineering student on a tight budget trying to get some test equipment together.

I wonder if one of your readers can help me with the restoration of a universal counter made by Takeda Riken with a model number TR5578C, and an additional plug-in range unit, model number TR3061M. A circuit diagram would be very useful but any information might help. I would be most grateful for any assistance and will meet reasonable costs. ***Please email rpapps@one.net.au***

Letters published in this column express the opinions of the correspondents concerned, and do not necessarily reflect the opinions or policies of the staff or publisher of Electronics Australia. We welcome contributions to this column, but reserve the right to edit letters which are very long or potentially defamatory.

Editorial Viewpoint

I was reading recently about the use of mobile phones as surveillance devices. Some phones can be set to ring silently, and to auto-answer incoming calls, making them ideal listening devices to be secreted in an office or boardroom, with the eavesdropper simply dialing up to hear what's being said.

The big problem with designing listening devices in the past has been in transmitting a signal strong enough to be received an appreciable distance away. There has also been the problem of size, battery power, secure transmission of the signal, and the need for a sensitive receiver at the other end to pick up the transmission.

New technology is usually considered to be a good thing, but is it really?

If you think about it, digital mobile phones have addressed all of these problems – small size, high power battery technology (some giving up to four days standby time), digital signal transmission and, of course, the ability for the eavesdropper to listen in from any phone, anywhere in the world.

Another privacy issue has surfaced with the recent proliferation of miniature CCD video cameras. In an effort to reduce crime, these are mounted either discreetly or indiscreetly in public places to monitor the activities of the general public. In some cases blanket coverage is given to specific areas, with whole stretches of public roads and footpaths monitored 24 hours a day.

Digital mobile phones and miniature video cameras are generally considered to be a good thing, but do we realise the problems we are creating for ourselves? I don't mean physical problems (such as radiation from mobile phones), but rather the sociological ones.

Are we happy to let 'Security' spy on us as we go about our daily business? If they can monitor a street, why not let them monitor our front doors? Or our living rooms -- that would certainly reduce crime, wouldn't it?

Modern electronics can perform these monitoring, surveillance and identification tasks very subtly, and without the subject even knowing that he's attracted interest. A good example of this is software that performs pattern recognition on faces in the crowds at British soccer matches. The digitised images are automatically compared against a database of past offenders, and the alarm raised if the software recognises a face.

Scary stuff, but it's all for our own good, apparently...

We've developed miniature cameras, huge databases and high powered processors to make this all possible, but we haven't developed the social or legal rules to control its use.

It looks as though this potential invasion of privacy is just something we will have to accept, because we really can't do very much about it. Everyone embraces new technology and marvels at the wonderful new toys they get to play with, but the potential for misuse is ever growing as these toys become more and more powerful.

Editor

WHAT'S new

in the ever-changing world of electronics

New THX DVD player targeted at audiophiles

The new Denon DVD-5000 is a reference-class DVD video player featuring a number of leading edge technologies, including Denon's proprietary AL24 processing, multiple 24 bit 96kHz D/A converters and DTS compatible digital output. It is able to play DVD video discs, Video CDs, Music CDs, and 2-channel 24-bit 96kHz digital audio discs. It will also play Dolby Digital and DTS encoded discs

The DVD-5000 is further equipped with HDCD decoding that has been combined with Denon's digital technology to bring out the highest quality in sound possible with HDCD-encoded CDs. It automatically senses the type of disc that has been loaded: an ordinary CD, a DVD disc or an HDCD. The DVD-5000 then processes the signal based on the type of disc detected. To maximise the potential of current and future digital audio systems, the DVD-5000 incorporates Denon's AL24 processing and a 4 x 24 bit D/A converter section that supports 96kHz sampling.

"It is a DVD player for the audiophile" says Stephen Ismay, Product Co-ordinator for Denon consumer products. "This is a totally uncompromising component that has been designed to complement the most sophisticated home entertainment systems, particularly those that are primarily biased towards perfect sound reproduction."

For further details contact High Profile Communications on (07) 5449 1601

Elegant TV offers split screen viewing

Philips' new 68cm Flat Matchline TV boasts all the very best technologies of Philips televisions, such as Smart Sound and Smart Picture, as well as a smart looking silver finish, and a silver wire mesh screen surround.

If you want to create an all-round style, an optional matching stand designed for the Flat Matchline is available.

The Flat Matchline (model 29PT6231) includes the innovative Smart Picture feature which allows you to select one of four presets (Soft, Natural, Rich and Personal), to automatically adjust picture elements for the best possible viewing.

Equally, Smart Sound lets you choose the best sound to suit the TV show you're watching, with four audio presets - Theatre, Music, Voice and Personal.

Excellent picture quality, and perfect images from wherever you're standing in the room, at any angle is achieved with the Philips Black Matrix Tinted Real Flat CRT. You won't strain your eyes either, because the TV screen has a built in anti-reflection coating.

The Philips Flat Matchline includes two tuners, offering the flexibility to view two screens at once, using either a split screen, or MegaPIP (giving a full screen image with a reduced second window).

The built in Philips Smart Surf lets you easily recall your favourite channels, and a child lock feature lets you disable selected channels when you are not around. RRP: $1899, for further information, contact the Philips Customer Care line on 1300 36 3391.

High speed digital video camera

Kodak's DVC325 makes videoconferencing easier than ever, and lets you take digital pictures and shoot digital videos from a personal computer. This third-generation, high-speed Universal Serial Bus (USB) digital video camera features a new portable and compact design, with adhesive mounts for attachment anywhere.

Users can detach the camera for hand-held operation within range of its three-metre cable. Unlike many similar products that require the user to be at the keyboard, Kodak's patented and unique shutter button design lets people take still pictures or videos directly from the camera.

The DVC325 ships with a comprehensive software bundle that includes two new programs — Presto! VideoWorks and Presto! Mr. Photo — for still pictures and video applications. The camera also comes with Microsoft NetMeeting software for videoconferencing applications.

The camera supports the industry standard videoconferencing requirements of CIF (352 x 288) and QCIF (176 x 144) resolutions. It also offers 160 x 120 and 320 x 240 video modes. The camera can also capture as a rate of 8fps at a full 640 x 480 resolution. It uses a progressive-scan color CCD with square pixels to offer a maximum image resolution of 640 x 480 pixels in 24-bit color. Equipped with the highest-resolution sensor of all current USB digital video cameras, the new camera can store full 640 x 480 uncompressed images directly on the host computer in seconds.

The Kodak DVC325 digital video camera has a suggested retail price of $299 and comes with a one-year warranty. For more information, contact Kodak on 1800 674 831 or **www.kodak.com.**

The phone that knows you...

It flips, it shakes, it remembers your name — the new Ericsson T18 mobile phone features an active flip, voice activated answering and dialling, as well as a vibration alert. With up to four hours talk time and four days standby, the T18 supports Short Message Services (SMS), and can store 100 telephone numbers in addition to SIM dependant storage. Up to 10 numbers can be stored for voice activated dialling, and it operates on both GSM 900 and GSM 1800 networks. For more on the T18, contact Ericsson on 1300 650 050.

Burn your own audio CDs on new Surround Sound Mini System

CD recording is here, in a mini system! Philips has revolutionised the mini sound system market with the inclusion of a CD Recorder as part of their new FW595 CDR Surround Sound Mini System, making CD recording an affordable reality.

It plays both CD-Recordable and CD-Rewritable discs, such as those created on Philips' CDR765 Dual Deck CD Recorder. The system is Digital Recording Ready, offering the ability to record from digital and analogue sources, including CDs, tapes and LPs. The system's four speaker Surround Sound, with 2 x 100W and 2 x 15W RMS fills the room, and you can create exactly the sound you want with Philips' Sound Navigation technology. Selecting from 26 different sound settings based on six basic settings - Classical, Rock, Vocal, Techno, Optimal and Jazz, it gives you the freedom to optimise the music output, just the way you like it. The unit also features three-way bass reflex speakers, and a digital tuner with 40 presets, for simple, quick access to radio stations.

It's truly an incredible innovation - CD Recordable at your fingertips, for an affordable price of $1299. For further information, contact the Philips Customer Care line on 1300 36 3391.

WHAT'S new in the ever-changing world of electronics

Quality car stereo from Blaupunkt

A new level of in-car sound quality and style has hit the market with the launch of Blaupunkt's latest range of car stereos, the Skyline series.

The new range consists of five sleek models, and provide unmatched sound and user friendliness. Common to all models in the range is the ability of each unit to accommodate individual programming. This includes the clever use of multifunction keys that can be used as traditional station selection keys while the unit is in tuner mode, or control a variety of operational functions when a CD or tape is inserted.

In terms of sophisticated sound features, the San Francisco and Atlanta are equipped with a self-adjusting, seven-band equaliser. The self-adjusting equaliser or Digital Sound Adjustment (DSA) is a first for this price category, and delivers perfect sound because the sound curve is adjusted to the vehicle's acoustics.

Dynamic Noise Covering (DNC) has also been modified in the San Francisco and Atlanta and dynamic compression has been added. This eliminates those annoying jumps in volume when the driving noise is loud and the music switches from quiet to dynamic passages.

The four integrated 40W output stages in the Seattle and Paris stereos provide powerful sound and a dual band equaliser (digital parametric equalising) allows the user to make basic adjustments to accommodate the characteristic acoustics of the vehicle interior.

For more information on the new range of Skyline car stereos, contact Robert Bosch (Australia) Pty Ltd on 1800 629 414.

That's not all, folks...

A new home theatre package from HTX Technology gives you the lot. Their US$1999 PC-TheaterPlus! system contains the following:

A DVD/CD/VCD player with S-video, TV, composite and SVGA outputs, wireless keyboard, handheld remote, TV tuner & digital VCR, (with instant replay), floppy and 6.4 GB HDD, 350 MHz AMD CPU, 64 MB RAM, 56K V.90 modem, MP3 Jukebox Player, Windows 98, Dolby Digital compatible surround sound, all connection cables, a colour camera, an X-10 ActiveHome Automation system, a 4-in-1 computer controlled universal remote, Dragon Dictate voice recognition software, microphone and headset, as well as access to the PCtheater.net and Mp-X.com Entertainment Portals. Phew!

Did you spot the missing item? Yes, you have to supply your own monitor or TV, but who's complaining? Check out the Unique Products Systems web site at **www.htxtech.com** for all the details.

New breed of console from Soundcraft

Hot on the heels of Soundcraft's successful Series Five comes series Four, one of a new breed of compact front-of-house consoles which brings the operational benefits of VCAs and automation within budget.

With the familiar control layout found on its bigger brother but with a smaller footprint, the fully modular Series Four is available in four frame sizes providing 24, 32, 40 and 48 mono inputs into 8 group buses, 10 aux buses and stereo and mono main mix buses. Four full-function stereo input channels are also included in each frame, and the output section includes 8 VCA groups and an 18 x 8 matrix section which includes feeds from four of the aux buses.

For theatre applications, optional Showtime automation can also be added. This powerful package runs on an external PC and provides scene-set automation, remote control of FX devices and built-in Virtual Dynamics on every channel.

Standard features on the Series Four include pre/post switches, four-band EQ, LCR panning on inputs-mix and groups-mix, balanced sends and returns throughout, balanced direct outs, VU output meterbridge and console linking capability.

Series Four is distributed in Australia by Jands Electronics. For more information, contact Jands on (02) 9582 0909.

Palm-style digital video camera

Panasonic's new palm-style digital video camera — the NV-DS99 — features a large 3.8" (9.6 cm) colour LCD monitor featuring 220,000-pixel resolution.

With this model, Panasonic has also introduced a new quick charging battery system. The time for a full charge is reduced by up to 40%, and a 15-minute charge can provide up to one hour of continuous recording.

The DS99 has a 120x digital and 12x optical zoom, and is sold with AC adaptor, battery pack, output terminal box, AV cable, S-Video cable, shoulder strap, soft bag, 30min Mini DV cassette, and digital video head cleaner. Optional accessories include lithium battery pack, car adaptor, 5-pin synchro cord, wide and tele conversion lenses, ND filter, stereo zoom microphone, shoe adaptor, editing controller, video titler and editing and DV cables.

The DS99 is priced at $4349 and is available now from leading electrical retailers. For more information contact the Panasonic Customer Care on 132 600.

High quality mini TVs

New from Dick Smith Electronics are the Digitor 10cm (4") and 25cm (10") colour TVs. These would be ideal for taking on holiday or camping trips, and can be powered from either batteries or an external power source such as from a car or caravan.

The Digitor 10cm portable is truly a hand-held set, with a TFT liquid crystal screen, giving bright, crisp images. The larger 25cm model uses a mini CRT display, and comes with remote control, on screen display, sleep timer, 30 programmable memories and an AV socket for connection to a VCR. Both sets come with AC and car power adapters.

Pricing for the 10cm set is $399, and $499 for the 25cm model. For more information, contact Dick Smith Electronics and Powerhouse stores Australia wide, or call Their Direct Link number on 1300 366 644.

50 inch plasma display panel now available

Home Theatre and video viewing may never be the same again thanks to world first technology from Pioneer and leading hifi and video store, Sound & Vision. Pioneer's revolutionary 50-inch Plasma Display Panel is claimed to be the worlds first Plasma Display Panel with the true XGA resolution.

Able to be mounted on wall, tabletop and ceiling installations, the Pioneer PDP-501MX Plasma Screen ranks as one of the world's slimmest and lightest 50-inch Plasma screens with a weight less than 43kg. The 1280 x 768 high-resolution panel is capable of reproducing the highest quality TV, video DVD, movies and computer generated text and graphics, and is less than 10cm deep.

The Pioneer PDP-501MX heralds several revolutionary breakthroughs in plasma screen technology including a plasma cell structure that achieves a world class brightness level of 350ad/m^2

Additional features include 24 pre-drilled holes on the rear panel for easy mounting to walls, ceilings or desktop situations. Numerous input/output terminals include RS232C for computer connection, RCA, S-Video, BNC and Mini DIN for PAL signals, RCA x 3 for component video, BNC x 5 for RGB signals, D-Sub 15 pin for computer video and RGB signals.

The Pioneer PDP-501MX Plasma Panel is covered by the manufacturer's 12 months parts and labour warranty and a further 12 months by Sound & Vision's own customer satisfaction warranty.

For further information and pricing on the Pioneer PDP-501MX contact Sound & Vision - Bondi on 02 9387 5222 or email: FOSS469@hotmail.com. ❖

TRI COMPONENTS P/L
SUPPLIER OF ELECTRONIC COMPONENTS
www.tricomponents.com.au

Pioneer's VSX-D906S

5-Ch Digital Receiver

Designed very clearly for the digital surround sound era, Pioneer's VSX-D906S offers five full amplifier channels of 100W rating, plus an inbuilt Dolby Digital 5.1-channel decoder and a Lucasfilm THX sound management/control facility. Not to mention video source switching and Dolby Pro-Logic analog decoding thrown in for good measure — making it very suitable as the control centre for a home theatre.

BY JIM ROWE

WITH DVD VIDEO discs now beginning to be released in respectable numbers, even here in the windswept tundra of remote Region 4, many of us at last have access to movie software in a form capable of delivering full 5.1-channel sound, from Dolby Digital (AC-3) or DTS digital tracks. It's not surprising that this has kindled renewed interest in home theatre in general, and all of the components required to set one up.

Now you can of course experience quite satisfying surround sound from digital sound tracks using the older 'analog' type of four-channel decoder (such as a Dolby Pro-Logic type), or even from a conventional two-channel stereo system. But to achieve the full six-channel impact of today's 'blockbuster' movies with AC-3 or DTS tracks, there's really no way around it: you need full digital decoding, plus the appropriate number of power amp channels and speakers. And it all needs to be correctly balanced and set up.

If you buy one of the DVD players with an inbuilt Dolby Digital decoder, it's possible to do this all 'the hard way' using a bunch of stereo or mono amplifiers and speakers, and by spending the necessary time to set it all up. But it's very definitely a lot easier if you simply buy a digital AV receiver like Pioneer's VSX-D906S, and make use of its facilities — which include not only the necessary amplifier channels, but also built-in functions to help you set everything up quickly and easily.

Setting up everything is relatively easy and straightforward, thanks to an on-screen GUI system...

Pioneer has been in the amplifier/receiver business longer than most firms, so I guess it's not surprising that they've given the VSX-D906S just about every relevant function and feature you'd expect to see in a digital-era receiver. Mind you it's not exactly a small beast, measuring 420 x 177 x 449mm (WxHxD) and weighing just over 14kg; but this really isn't unreasonable when you consider what it provides.

For example there are five full-bandwidth amplifier channels, all rated at 100W continuous output into 6-ohm loads, from 20Hz to 20kHz with less than 0.09% total harmonic distortion. These use high linearity 'Hex power' MOSFETs in the output stages, and can clearly provide enough power to drive just about any speaker system — apart from the sixth '0.1' channel subwoofer/low frequency effects channel. As most people use an active subwoofer for this, the VSX-D906S simply provides a line-level 'Subwoofer Pre Out' capable of driving one. (There are also line level outputs for the other five channels, to drive additional power amps if you want them...)

For full surround sound operation the amps can be fed from the internal Dolby Digital decoder, which accepts either electrical or optical bitstream inputs — and also an AC-3 RF input from a laserdisc player, incidentally. There's a single optical bitstream input, two electrical bistream inputs and the RF input. It's easy to select the desired input, and a set of LEDs in one section of the front panel display automatically indicates the signal encoding/decoding mode (from Dolby

The Pioneer VSX-D906S gives you 100W of THX, Dolby Digital and Dolby Pro-Logic surround sound, and even comes with a high-tech remote control...

Digital mono right up to 5.1).

You aren't limited to signal sources with digital encoding, either. For the many movies on videotape or laserdisc with only 'analog' type surround sound — or perhaps just stereo — there's a full Dolby Pro-Logic Surround decoder, and finally a range of five different DSP modes as a fall-back to achieve satisfying 'pseudo surround' effects.

Needless to say there's quite a choice of analog-type signal source inputs: on the AV side you can select from either of two VCRs, a laserdisc player/satellite receiver or DVD player/TV receiver; then on the audio-only side you can select from a CD player, either of two tape recorders, or a conventional phono (magnetic pickup) preamp input — plus the inbuilt AM/FM stereo tuner, of course. So counting the digital inputs as well as those for analog sources, there's a choice of about 13 different sound sources to choose from.

I should perhaps add here that quite apart from its role in selecting, decoding and amplifying signals from any of these audio sources, the VSX-D906S also acts as a video signal source selector. It has both composite and S-Video inputs for each of the main AV sources (DVD/TV, LD/Sat, VCR1 and VCR2), and also a matching pair of outputs for connecting to your monitor/TV/projector. So the video side of the selected signal source is automatically selected along with the audio, and fed automatically to your monitor or projector. (There are also both composite and S-Video outputs for both VCRs, for recording.)

Rated frequency response of this video signal selection and buffering circuitry is from 5Hz to 7MHz, with signal to noise ratio and crosstalk figures of better than 55dB — so there should be negligible degradation of the selected video.

To enhance the sonic impact of the surround sound that's achieveable with the VSX-D906S in a typical home theatre setup, especially with Dolby Digital tracks, it features a number of Home THX Cinema technology enhancements licensed from Lucasfilm. These include Re-Equalisation, Dynamic Decorrelation, Timbre Matching, Bass Peak Level Manager and Loudspeaker Position Time Synchronisation. The last two of these are set up as part of the system setup/configuration operation, while all five functions normally become operational simply by selecting the 'Home THX Cinema' mode of operation.

Talking about setting up the system, this is relatively easy and straightforward, thanks to an on-screen GUI system (which can be set to operate in either PAL or NTSC video formats, by the way). Once everything is hooked together and the receiver powered up, you simply press the Receiver and Sys Setup buttons on the remote, and you're in setup mode. It's then simply a matter of working your way through a sequence of four setup screens, covering in turn Speaker Setting (number in use, their sizes etc), Channel Delay (via distances from the main listening position), Channel Level (to adjust for speaker sensitivity and set overall balance) and finally Bass Manager (to adjust for correct tonal balance in your room and with your speakers). There's a choice of either automatic or manual sequencing of the built-in test signals, and it's all designed to make the operation as easy and intuitive as possible.

Other nice features of the VSX-D906S include a 'Direct' mode for bypassing all of the tone control circuitry when playing CDs; a stereo phone jack on the front, along with an additional set of AV inputs; built-in A-B stereo speaker switching; the ability to set the AM and FM channel spacing correctly, for the tuner; a thermostatically controlled cooling fan; and a very powerful remote control, which is capable of controlling a wide range of components in addition to the VSX-D906S itself, via both pre-programmed and 'learning' capabilities.

By the way, the remote can perform full receiver tuning and input source selection as well as operating mode, system setup, volume control etc. Volume control is via a motorised multi-section pot, for better noise and distortion performance than a fully electronic attenuator system. A small LED on the main volume knob lets you easily see the

As with most five-channel receivers, there quite a forest of connectors at the rear — although no set of six-channel analog inputs for use with an external decoder, as it happens.

At right are the digital bitstream inputs that appear to have been added as an afterthought...

control responding, even in subdued lighting.

What we found...

As you'd expect we ran the usual basic tests on the review sample VSX-D906S, and the results were quite impressive. It gave just over 94W RMS per channel into our reference 8Ω loads before the onset of clipping, suggesting that it would easily meet the specification of 100W into 6Ω. The THD figure at 93W was measured at 0.034%, well below the rated 0.09%.

This performance was virtually identical whether one or two channels were being driven, and in fact only changed very slightly when three channels were being driven — suggesting that the power supply in the VSX-D906S is quite well regulated and capable of meeting the challenge of driving five channels. When we took a look inside the case we could see why: there's a very large electrostatically shielded power transformer, and some sizeable reservoir caps.

Measured frequency response for the CD inputs in 'direct' mode was very smooth, and only 0.11dB down at 20kHz and 3dB down at 10Hz — very close to spec. The power response was 1dB down at 20kHz and 20Hz, which is again very good. Signal to noise ratio measured 91dB, while the channel crosstalk at 93W output into 8Ω was measured at -67dB.

In short, the VSX-D906S gave a very good account of itself on the instruments, so we expected it to sound quite impressive in the listening tests — and we certainly weren't disappointed.

We tried it out with the Jamo Apollo speaker system reviewed in last month's issue, and with both CD and DVD players. Setting up the system to match and balance the Apollo speakers was very straightforward, and we were then able to try out the receiver with a wide range of software, from stereo CDs to DVDs with full Dolby Digital 5.1/THX mastered tracks.

The results can only be described as excellent. We tried feeding the VSX-D906S from the DVD player via both the electrical and optical bitstream inputs, and frankly couldn't detect any difference. In both cases the sound was very clean and undistorted, regardless of the number of channels in operation (which of course depended on the software). We had the distinct impression that the main determinant of the quality of sound we were hearing was the recorded sound itself and perhaps its encoding — the VSX-D906S was essentially transparent.

No gripes at all? Well, we did find the speaker terminals at the back a bit irritating; like those on other multi-channel amps and receivers we've checked out, they're spaced quite closely — and don't accept standard banana plugs, either. This makes hooking up the speaker cables a rather fiddly and time consuming operation...

Our only other complaint is that the VSX-D906S doesn't have a full set of five-channel analog inputs, to allow you to use external decoders for DTS, MPEG2 or other digital encoding apart from Dolby Digital. With these other formats, you'll really be forced to play them in stereo or use Dolby Pro-Logic decoding for four-channel analog surround.

It would have been nice to have one set of multi-channel analog inputs, to allow the use of external decoders when you want. But apart from these relatively minor points, the Pioneer VSX-D906S is an excellent performer and would make a good choice as the 'control centre' of a digital surround/home theatre system. ❖

Pioneer VSX-D906S Digital AV Receiver

A five-channel (5 x 100W) AV receiver with built-in Dolby Digital 5.1 decoder and Lucasfilm THX Home Cinema enhancements.

***Good Points**: Clean, transparent five-channel sound; high quality DD 5.1 decoding, from either electrical or optical bitstream inputs; very easy system setup using on-screen GUI.*

***Weak Points**: Speaker terminals closely spaced and don't accept standard banana plugs; no multi-channel analog inputs to allow use of external decoder for DTS, MPEG2 etc.*

***RRP**: $1999.*

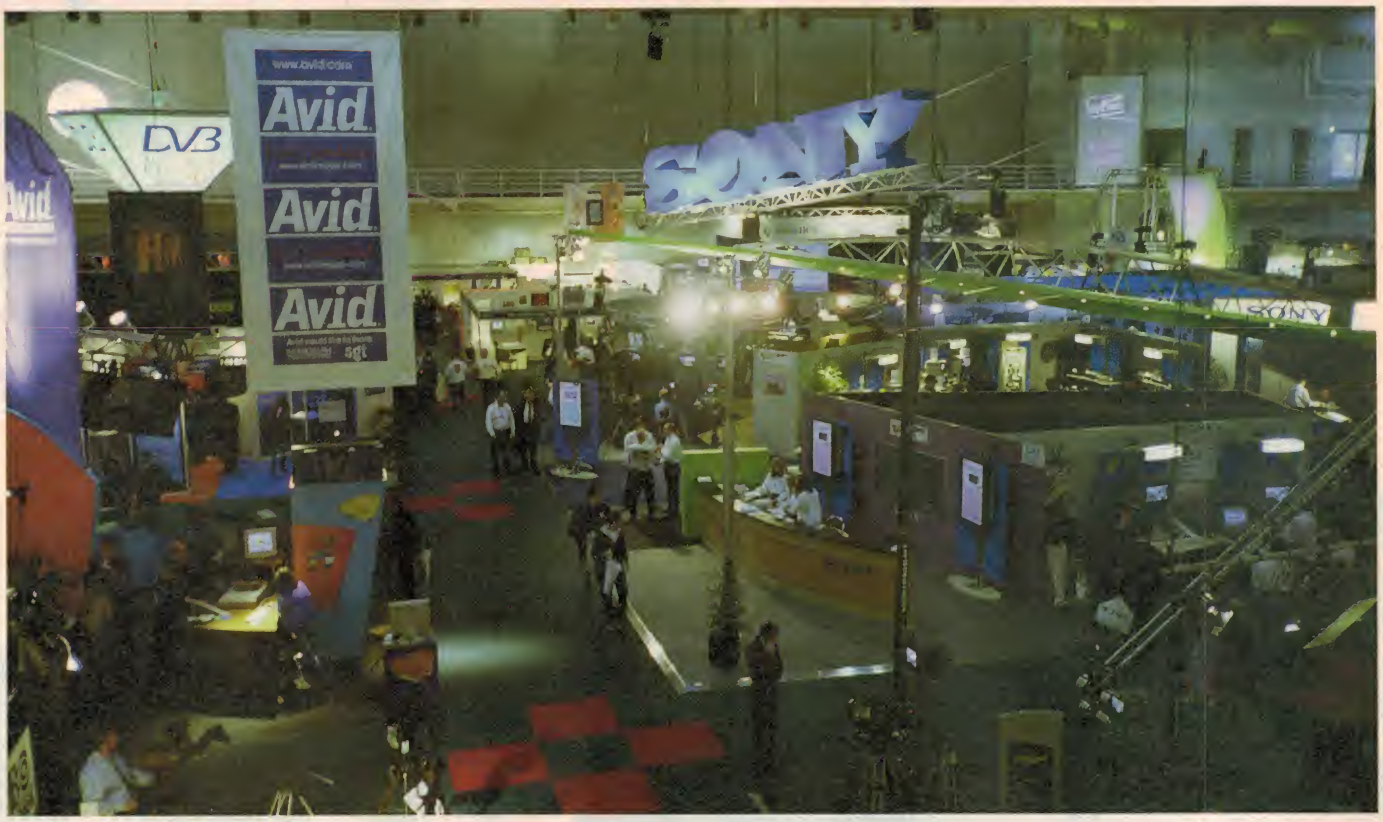
***Available**: Pioneer Audio/Video dealers, or call Pioneer Electronics Australia on 1800 338 439.*

With a powered display that moves smoothly and silently to your most comfortable viewing angle, EYE FI is literally that. Sound for your eyes. With an optional Dolby Pro Logic® processor you can achieve cinema-like surround sound. You can even add to your CD Tuner base with a MiniDisc or Cassette component. Which means beauty is equally in the eye of the listener. To find out more about Eye Fi call us on 1800 060 852.

Smaller than WAR & PEACE
and far easier to read.

PNR 313

Pioneer



SMPTE 99 in Sydney

Every couple of years Sydney plays host to SMPTE — a convention of the Australasian division of the Society of Motion Picture and Television Engineers. This year's show attracted a lot of interest in the digital video field, but good old film is still in the running, as you'll see.

BY BARRIE SMITH

OVER THE 15 years that I have attended SMPTE in Sydney there has, inevitably, been change. At the dawn of the 90s, the relative absence of film interests was noticed. Over the last few years, traditional analogue broadcasting has receded as digitisation has taken over, not only in areas connected with the capture of programming material, but also in post production and the broadcast transmission technology itself.

This trend was particularly noticeable at the Sydney Darling Harbour conference and exhibition held between July 13-16 this year, where close to 110 companies and organisations exhibited to an attendance of around 7000.

Next trend

So what's the next big trend? Probably the Net. And it couldn't come sooner for some people, such as my colleague who queued up for his prebooked (via the SMPTE Web site) ticket, only to find when he arrived that there was no record of the booking, nor of his $340 credit card payment. Ah, progress! There was another no-Net surprise for those who attended the briefing by the 2000 Olympics Games broadcast team — but more of that later.

Big screens

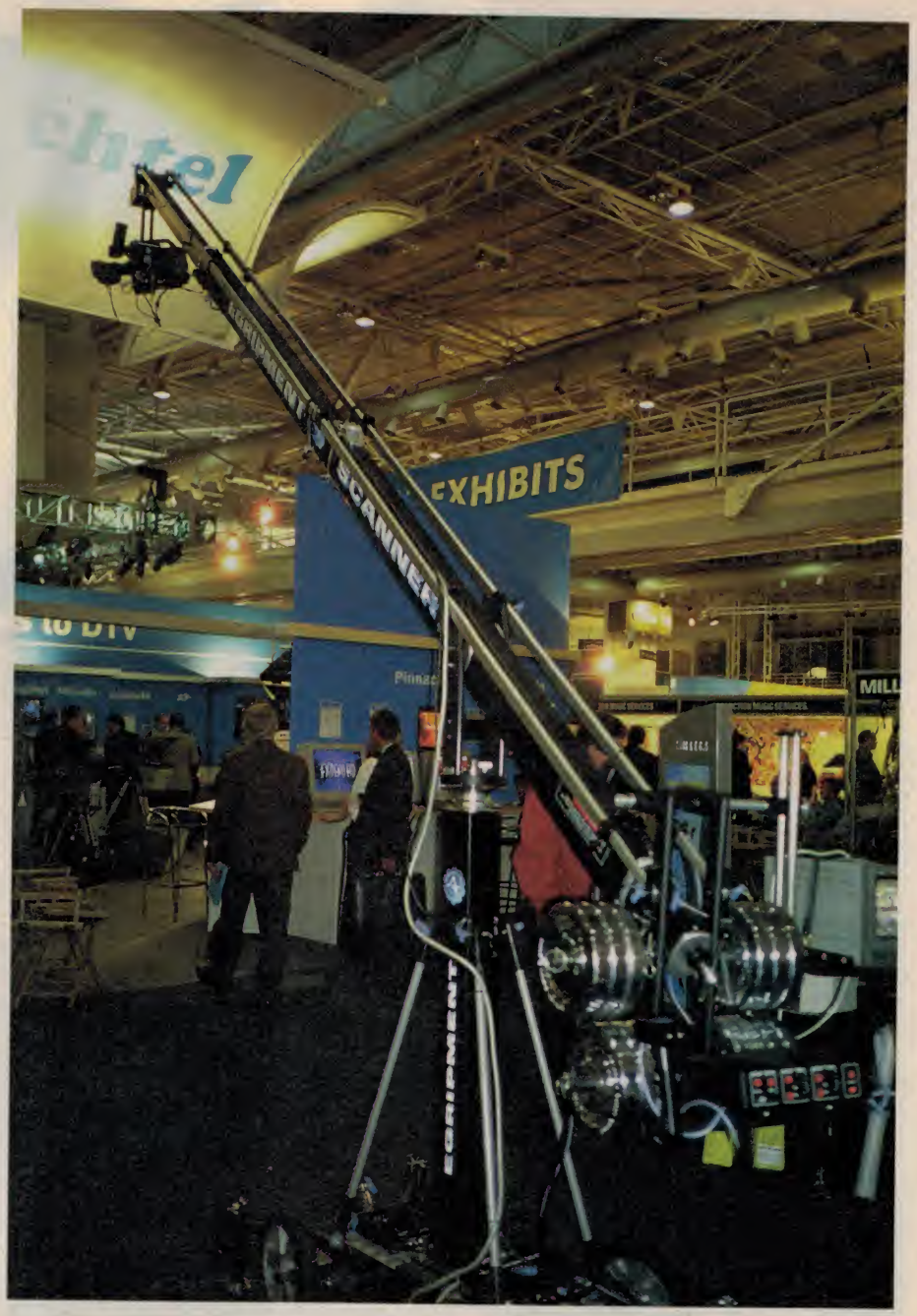
This year there was a plethora of large plasma screens, ably augmented by a number of large screen projection systems.

The Fujitsu stand was impressive with its array of nine 42-inch plasma screens suspended way over the heads of the crowd; at a weight of 38.5kg per screen you can only admire the rigger's handicraft!

The stand reps explained that there were in fact four ranges of 42-inch sets available from the company, priced between $14,500 and $22,000. It was also enlightening to learn that the company OEMs most other Japanese companies' plasma screens; this was confirmed by a senior exec of Sony who explained that, in these tight times, Japanese companies adopt a more financially rational outlook to 'owning' a technology.

Having had the opportunity to view plasma set after plasma set, you realise that the picture display is quite pleasant to watch. Noticeably

Cranes were flying all over the exhibition, like this Egripment Scanner model.



absent is the 'glow' effect of a CRT set, with the picture more resembling a large poster — and of course there are no reflections from the plasma set's flat front surface.

The Thomcast transmission systems stand also featured a pair of Sony plasma sets showing a live digital transmission from the Channel Seven HDTV test site at Artarmon.

Sony's always lavish and spacious stand featured a series of presentations on digital TV. Plasma sets displayed test transmissions from both Channel Nine and Seven, with the latter station's transmission being the target destroyer downed by the hapless Collins class submarine. I learned that Sony had supplied a Digital Betacam and an HD camera to the Navy to shoot the sinking from the vantage point of a helicopter.

In a darkened theatrette, an arrangement of three rear-projection screens (each measuring two metres diagonally) showed analog and digital side by side. Behind the screens were three Sony CRT projectors. A presentation of this scale was confirmation of the quality of HDTV, and its much reduced line structure, although occasionally the compression artefacts of MPEG2 were apparent.

Two exhibiting companies active in the large screen projection area were Barco and Ampro. The Barco Reality 9200 LCD projector threw a very large, crisp and bright picture measuring around 3.5 metres in diagonal and was an indication of how impressive this form of large screen television can be - with an output of 5000 ANSI lumens!

Ampro took a different approach with their 5000MX model, outputting 1300 ANSI lumens. They have adopted the Texas Instruments DLP (Digital Light Processing) 3-chip device for the image source. The TI chip is similar to the one that may be employed by George Lucas in his digital cinema chain. (The signal was provided by an NTSC DVD player, with the movie being the first Austin Powers movie. Well, at least the picture quality was worth looking at...)

Back in 1994 local distributor Hagemeyer loaned the Hughes JVC Super ILA (Image Light Amplification) projector for use at the SMPTE conference. This excellent projector has been used at the show ever since, to the enjoyment of the attending audience.

Founded upon 800 patents, a 6000 ANSI lumens projector was also running hot for demos on local Silicon Graphics distributor Future Reality's three metre screen.

Exhibition

The two halls contained a variety of company exhibition stands. The range was wide: companies such as Adimex and Avid showed their respective answers to film and video editing. These two competitive platforms have reached such levels of sophistication that editing and audio conformation is performed on everything from TV news items to main stream feature films world wide. Following close on the heels of the hardware resellers are the purveyors of sophisticated software solutions for video editing and effects creation. Farewell to the Moviola for ever!

In a seeming contradiction to my earlier statement that broadcast and digital technology has supplanted previously evident film production companies, there were some brave and highly visible presences by the hardware side of the industry. One was the newly appointed agent for the German Arriflex motion picture company, Cine Australasia, who showed examples of their 16 and 35mm cameras as well as an Angenieux 60X zoom fitted to a Panasonic DVCPRO video camera.

There is much heated discussion going on in production circles as to which capture medium will be the most favoured when 16:9 HDTV is up and running not only here (on Jan 1, 2001), but in other countries heading towards digital.

35mm film is a 'Rolls Royce' solution, offering as it has done for some time, top

quality for both wide screen TV and cinema exhibition. The Super 35 format (a three perf pull down, and wider aspect ratio frame which extends across the sound track area) is popular with the money men, especially in Australia.

Then there's Super 16, which takes similar advantage of the sound track area to elongate the exposed frame — and this format is currently being taken up with alacrity by Australian producers keen to future-proof their production schedules.

And then of course there's video capture. Sony showed its HDCAM format two million pixel camera, capable of switchable HD interlace capture as well as 24/25 frames per second progressive scan. There was also much interest in the company's upconverter able to raise the resolution of 4:3 images to HDTV's 16:9 demands.

John Bowring of Lemac cheekily demonstrated the French-made Aaton AMinima Super 16 'HDTV film' camera while TV's Don Burke looked on interestedly. Weighing only 2.2kg it can accept a 200ft coaxial load of film, runs 1-50 fps and is barely larger than a Robert Ludlum paperback.

There were a few odd rumours circulating at the show: one was that Aaton company was developing a 24mm film camera, set up to take the new APS 24mm amateur film format. Another was based on the fact that George Lucas had planned to shoot the next two Star Wars movies at Fox Studios in Sydney — on a new Sony digital camera; rumour now has it that he now may still make film capture the main aim and may not head Sydney-wards anyway!

Prominent at the show was a stand sponsored by the European DVB interests, handing out lavish PR kits on why terrestrial DVB is the way to go for digitally emerging nations. Australia and New Zealand have already announced their intentions to go DVB-T, and now it seems Singapore is heading that way, with Indonesia, Thailand, Hong Kong — and China — likely to follow. So it looks like the old analog NTSC/SECAM/PAL waltz again!

Also present was veteran film industry company, the John Barry group (now part of the Panavision network). This company is soon to take on distributorship of Philips broadcast cameras.

Camera cranes seemed to be poking up their extended necks over the stands in both halls. The German company Panther showed off its impressive Pegasus crane while one was even for sale — the ACT-made Emu Camera Crane, nine metres stretch for $35,000.

Ampro's 5000MX projector uses a Texas Instruments DLP imaging chip, and outputs an impressive 1300 ANSI lumens.

Conference

Meanwhile back in the theatre...

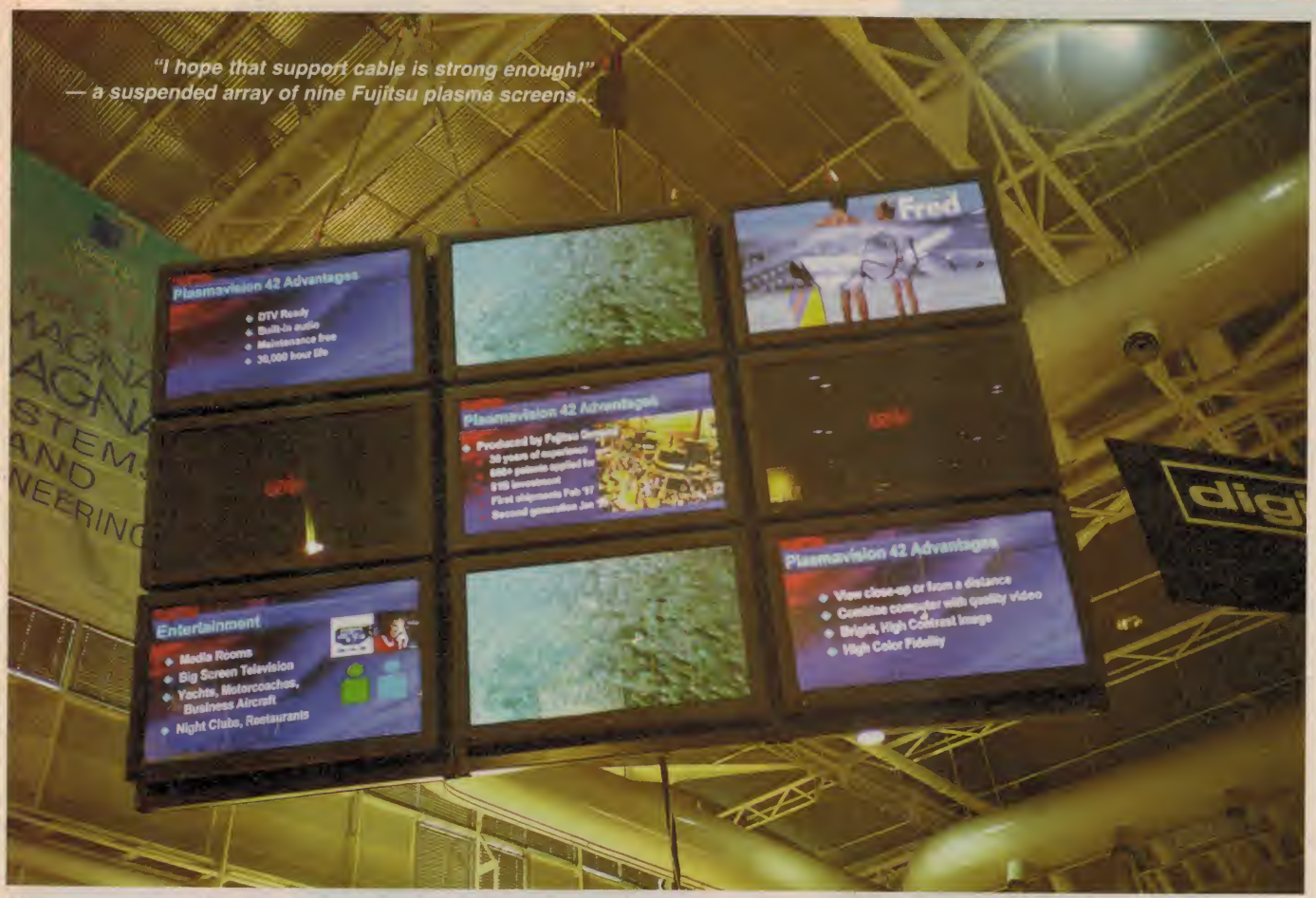
A kick off session on the first day allowed an illustrious panel to wander through the perils and promises of MPEG, under the title of 'What MPEG is that?' Which just about gives you an idea of what to expect when digital TV begins.

The opening keynote speech by the BBC's Ian Childs began 25 minutes late, surely an (unkind?) indication of what to expect if engineers were entrusted with the scheduling of the nation's TV stations. However, the informative paper delivered by Mr Childs on how the BBC went about taking Britain to a digital state, only further confirmed that the 'old lady' sure does do things thoroughly when venturing into new technological spheres.

In the run up to digital broadcasting in the UK, the output of a number of transmitters was checked from a helicopter (right up close to the radiating element) to reveal that the signal was not getting out the way it should. Some older antennae had been putting out poor signals for 30 years or more.

He then proceeded to totally disarm this writer by making the worthy comment, after

One of many demo stands. This one is showing off Canon's video lens range.



"I hope that support cable is strong enough!" — a suspended array of nine Fujitsu plasma screens...

side by side viewing of analog PAL and the new digital transmissions, that digital was "pretty good". He determined that in digital there were no cross colour problems, while with PAL you avoided any compression artefacts. So, after the Australian industry spends its hundreds of millions on digital, is that all we're going to get — 'pretty good' TV?

Sydney 2000

July 15, 1999 is a date exactly 14 months out from the beginning of the 2000 Games at Homebush Bay. A fitting date, therefore for a panel discussion on SOBO's efforts to broadcast the events to Australia and the rest of the world.

One SOBO delegate commented that the 1936 Munich Games were telecast — to 3000 people. The rights cost zero dollars.

Billions will see the 2000 Games on telly. The rights cost $1 billion plus. And there will be more underwater cameras used in Sydney than there were above ground units at Munich.

There will be 30 broadcast compounds and 44 venues ranging from 400-6000m² in area. The Aquatic centre is 6000m². Expect to see 34 OB vans, 700 cameras — three slomo units, 156 handheld — plus nine underwater cameras as well as 97 remote heads and 39 cranes in use. There will also be 400 VTRs, and 2000 mikes.

A Steadicam and operator with a broadcast video camera.

A gent from Microsoft asked would there be an Internet site carrying video and audio of the Games. The answer in short — No. The feeds would be given only to the paid up rights holders — Australia's Channel Seven, ABC Radio and 2UE; and the US network NBC plus NHK's singular HDTV coverage.

Pretty impressive news. But then an audience member asked how SOBO was going to handle the high levels of RF which have historically been a feature of the Homebush Bay environment. Raymond Reynolds of SOBO answered that it was indeed a 'hostile environment' with not only gallons of RF present, but a 300kVA sub station handily located nearby. So, Mr Reynolds' answer was, in routing signals around the precinct 'when there's a problem, they will run fibre.'

That should give us plenty of 'pretty good' pictures.❖

PUT YOURSELF ON THE NET with the QuickCam Pro

Webcams are pretty hot items at the moment. With the prices for miniature CCD cameras falling rapidly, and the trend for ISPs to offer unlimited connections, setting up your own personable webcam is quite feasible. We thought we'd set one up here at EA, and it wasn't nearly as complicated as we thought.

BY GRAHAM CATTLEY

Look around the web, and you'll find an increasing number of webcams — digital cameras that photograph their surroundings, and automatically send the picture to a website. Some of these cameras are quite famous, such as the one in the Trojan Room, which monitors the coffee maker at University of Cambridge Computer Laboratory. Some simply record the day-to-day goings on of people in their homes, while others can give you real time views of Sydney Harbour, or the front of Buckingham Palace.

In an effort to bring you a small taste of all the verve and excitement that goes on here at EA, we thought we'd see what was involved in setting up a webcam in the EA office. We have a direct connection to our website via a LAN, and so we thought that there shouldn't be too much in getting something going.

Most of the computer-based digital cameras available commercially are designed primarily for videoconferencing, and seem to pride themselves on their speed of capture — up to 30 frames per second with some models. This was a far cry from the single shot every five minutes that we wanted, and from all the promotional material we came across, the best these sorts of cameras could do was to save the results as a Windows AVI animation file. There is software around that can extract an image from an AVI, but trying to get it to automatically save the results with the same file name each time was starting to look messy...

Logitech's answer

Then some bright spark suggested that we look at the Logitech QuickCam Pro. We got in touch with someone at Logitech's Tech Support who

seemed to know what he was talking about, and apparently yes, the QuickCam would do everything we wanted and more... This was our best lead yet, so we forked over the (quite reasonable) $270, and waltzed out of the shop with the rather strange beast that you can see in the photo. We went for the parallel port version rather than USB, as we intended to run the thing on an older 486 that gets little use in the office these days.

The software was a breeze to set up, and we were quite surprised at the features and flexibility that it offered. You can set the size of the captured image up to 640 x 480 pixels, the colour depth, the file type (JPG, BMP, etc.), and even get it to compensate for low or high light levels. As well, you can dial up the capture rate, the file name of the saved image, and even the address to FTP the final image to. Great! This was just what we wanted.

Once installed, we plugged the QuickCam into the parallel port, powered it via the supplied T-piece from the keyboard cable, and we were away. It even generated a ready-to-go web page and uploaded that along with the first image captured with the camera.

I suppose that in the end it was all a bit of an anticlimax — we were expecting it to be complicated, but it turned out to be about as simple as you can get. The only problems we had was that from time to time the computer running the QuickCam software would freeze for anything up to 10 minutes at a time. These lockups always resolved themselves, and didn't cause much of a problem, unless you were trying to use the computer for something else at the time (such as writing a review...).

The thing that surprised us most about the QuickCam Pro was that nowhere on the packaging or advertising was there any mention of it's ability to be used as a webcam — everything was either directed at capturing high quality images, or videoconferencing. This was strange, because the thing was obviously designed to be used as a webcam, and it does a pretty good job of it to.

One thing we learned was that you don't need a direct connection to your web server to get a webcam happening. Even if you have a standard dial-up account with an ISP, you can still configure the software to upload whenever you are on line. And with the recent trend for ISPs to provide unlimited access for a fixed monthly fee, there's no real reason why your webcam couldn't be operating 24 hours a day. (Of course no one could call you unless you had a separate phone line, but they could go and *see* you on your homepage!)

If you want to see the end result, why not hop along to our website and have a look for yourself. The address is **www.electronicsaustralia.com.au/webcam/webcam.htm**, or just follow the link from our home page.

The ease of use and simplicity of the system impressed us, and the results are better than we imagined. If you have the urge to put yourself on the web, the Logitech QuickCam would seem to be the way to go.❖

Logitech QuickCam Pro

Good points: Ultra simple to set up, and just *works*.

Bad points: System freezes from time to time, but comes good in the end.

RRP: Around $270.

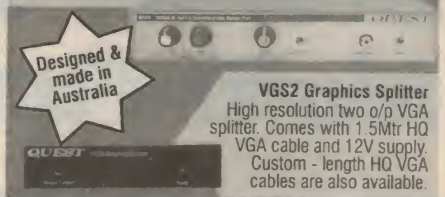
Available: Most retail computer stores, or contact Logitech Australia, Level 2, 633 Pittwater Rd., Dee Why, NSW 2099. Phone: (02) 9972 3711.

Web links

- http://www.cl.cam.ac.uk/coffee/qsf/coffee.html
- http://www.jaf.co.uk
- http://www.electrolux.com/node230.asp
- http://www.logitech.com

NEW FROM QUESTRONIX

DVS5 Video & Audio Distribution Amplifier
Five identical Video and Stereo outputs plus h/phone & monitor outputs. S-Video (Y/C) and Composite video versions available. Professional quality



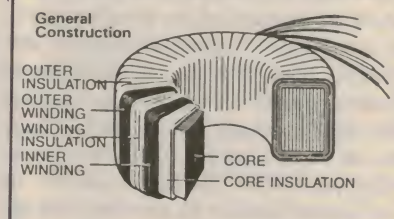
VGS2 Graphics Splitter
High resolution two o/p VGA splitter. Comes with 1.5Mtr HQ VGA cable and 12V supply. Custom - length HQ VGA cables are also available.

Check our NEW website for latest prices & **MONTHLY SPECIALS**
www.quest.au.com
VIDEO - PROCESSORS, MIXERS, COLOUR CORRECTORS STABILISERS, TBC's, CONVERTERS, AMPLIFIERS, ETC.
Email questav@questronix.com.au
QUESTRONIX Ph. (02) 9477 3596 Fax (02) 9477 3681
All mail to: PO Box 548 Wahroonga NSW 2076
Visitors by appointment only

fischertechnik
ROBOTIC KITS FOR COMPUTERS
Mobile Robots
Walking Robots
Robot Arms
Machines
Computer Interfaces

DIY construction kits. Numerous types available with or without computer control. Programming in many languages - DOS and Windows. See our website for more details and free demo software.
www1.tpgi.com.au/users/p8king
PROCON TECHNOLOGY
PH: (03) 98306288 FAX: (03) 98306481
BC, MC, Visa accepted. Email: procon@tpgi.com.au

TOROIDAL TRANSFORMERS



- 15VA - 800VA ex-stock
- 10VA - 7.5kVA to order
- Low flux for audio use
- E/S, flux band available
- Standard or epoxy mount

Harbuch Electronics Pty Ltd
9/40 Leighton Pl. Hornsby 2077
Ph (02)476-5854 Fx (02)476-3231

Brother's MFC-970MC Multi-Function Centre

Compact and cleanly styled, the Brother MFC-970MC provides a total of seven handy desktop functions: it's a fax, a copier, a PC and scanner, a PC-driven fax, a digital answering machine and a full duplex speakerphone — with a normal handset phone thrown in for good measure. The fax and printing functions use plain paper, too.

BY JIM ROWE

PERHAPS YOU HAVEN'T noticed, but the humble fax machine has evolved quite a bit in the last couple of years. Thanks to galloping digital technology, manufacturers have been able to add all kinds of bells and whistles to the basic phone-plus-fax functionality, and *voila!* In many cases they've now become that Swiss army knife of desktop appliances, a *multi-function centre*.

The name might sound a bit vague, but these devices can be much more useful than you'd expect. In effect they combine quite a few of the desktop appliances that many of us seem to need nowadays, in a single compact box — and at a price that's generally lower than you paid only a few years ago for a fax machine alone.

The Brother MFC-970MC is a good case in point. At first glance it looks pretty unassuming in its compact little case, which measures a mere 307 x 341 x 182mm and weighs only 4.3kg. Just a standard phone/fax, you might think. But when you look closer, you discover that inside that modest exterior there's a surprising amount of functionality and performance capability...

For a start the scanner and printer functions of the fax part of the machine can be used together as a digital photocopier, able to perform both reduction and enlargement and make up to 99 copies from one original.

The printer, scanner and fax modem functions can all be used separately, too. So by hooking the MFC-970MC up to your PC via the serial port interface kit provided, you can use it as a TWAIN-compliant graphics scanner, a 200dpi Windows-compatible GDI-type printer or a full blown PC-driven fax with electronic cover sheet generation, dialing and broadcasting via a 'phone book' on your hard disk, and so on.

By the way, as the fax modem runs at up to 14.4kb/s, the MFC-970MC is no slouch, regardless of whether you're using it as a conventional 'manual' fax or a PC-driven super-fax. So provided you have a good circuit, STD and ISD faxes can be sent quickly and economically — typically 15 seconds/page.

Quite apart from these facilities it also includes a built-in digital 'message centre', with a full duplex speaker phone facility plus a digital answering machine capable of storing up to 15 minutes of voice messages in solid-state memory. You can have up to five 'digital mailboxes', remotely retrieve both voice and fax messages, automatically forward faxes to a preset destination and also operate in conjunction with an external phone answering machine (TAD).

Plain paper printing

Another nice feature of the machine is that it uses 'plain paper' printing, rather than the thermal system. The engine isn't of the laser or inkjet type, but uses a wide roll of 'hi tech carbon paper' and a print head that gives fairly quiet and reliable 200 x 200dpi printing at about two pages/minute. It uses standard A4 copier paper, with a top-loading reservoir holding 100 sheets.

Needless to say like most modern electronic phones and phone/faxes, the MFC-970MC provides memory dialing facilities. There's eight basic memory one-touch dialing keys, which operate in conjunction with a shift key to give you 16 preset and named numbers which can be dialled using one or at most two keystrokes. In addition there's a 'Super Tel-Index' mode which gives you four more groups of eight preset and named numbers, which can be selected by either additional keystrokes or scrolling via the '<' and '>' keys (i.e., an electronic number index). This gives a total of 48 auto dial possibilities, as well as old-fashioned manual dialling if all else fails!

it's been very impressive. The phone sound quality is so good that various callers have commented on it, quite spontaneously

The scanner section of the machine offers fast 400 x 400dpi (interpolated) scanning, and the included 'Multi Function Link' software includes a TWAIN driver to allow scanning to be performed from within most standard graphics applications running under Windows.

The Multi Function Link software runs under Windows 3.1X or Win 95 — at present there's no version to run under Windows NT4 or OS/2, or on Macintosh machines. It needs at least 4MB of RAM, 10MB of hard disk space and a spare COM port with either a DB9 or DB25 connector (the interface cable has both plugs fitted). In addition to the TWAIN driver for scanning it includes a driver for Windows GDI printing and the Multi Function Link utility itself, which manages PC-controlled faxing and scanning functions. In addition the software includes Xerox's Textbridge OCR software, so you can also use the MFC-970MC to scan documents into text files. It's all on four 3.5" floppy disks.

Other impressive features of the MFC-970MC include a 512KB memory to store up to 20 typical fax pages, if the machine runs out of paper; a 10-page automatic document feeder; 64-shade grey scale transmission capability; delayed transmission capability; and auto fax detection, as well as compatibility with Telstra's Caller ID identification and 'Duet' distinctive ring detection.

In short, it really does perform a lot of handy functions, and all for a very reasonable street price of around $580.

What we found...

I've been using an MFC-970MC in my home office for quite a few weeks now, and have generally been delighted with its performance — even though I haven't really been able to make use of its PC-related functions, because my main office PC runs Windows NT4.

Even using the unit as a free-standing autodial phone/fax/speakerphone/digital answering machine, it's been very impressive. The phone sound quality is so good that various callers have commented on it, quite spontaneously.

The fax functions are generally very good, with rapid scanning and transmission, and fairly quiet printing. The print quality is quite respectable, too — approaching the clarity and durability of even laser-based plain paper faxes.

As a copier it's OK for emergency copying, but like most fax copiers the copy quality is not up to that achieveable with a standard xerographic copier. The MFC-970MC also seems to be a bit 'colour blind', reproducing reds and magentas as nearly black.

On the other hand the built-in digital answering machine is very easy to set up and use, and the outgoing and incoming message quality is very clean. Coupled with the memory dialing facilities and the speakerphone, this makes the MFC-970MC a very user-friendly little unit.

So if you're after a well priced multifunction centre for your home office, the Brother MFC-970MC would be a good choice — especially if your PC is running Win 3.1X or 95. ❖

Brother MFC-970MC Multifunction Centre

A compact unit combining a memory dialing phone and fax with a copier, PC-linked scanner/printer/fax, digital answering machine and full duplex speakerphone.

***Good Points**: Economical plain-paper printing and fax reception, using standard A4 paper; excellent voice quality; up to 48 quick-dial memories; reliable 'no moving parts' digital answering machine function.*

***Weak Points**: Software currently not compatible with Windows NT or Macintosh computers; copy quality not marvellous.*

***RRP**: $579.00*

***Available**: Most office equipment dealers, or enquire from Brother International (Aust.), 7 Khartoum Road, North Ryde 2113.*

THE TIGER COMES TO AUSTRALIA

You've seen the BASIC Tiger and Tiny Tiger advertised in the US magazines: they are now available in Australia from JED.

Tigers are modules running true complied (not tokenised), Multitasking BASIC at 20 Mhz, but only draw 45mA. They have memory, 4 x 10-bit analog inputs, digital I/O, two serial ports, RTC, and are superb small controllers for scientific and industrial applications. **A Tiger with 128kB FLASH, 128kB CMOS RAM and RT clock costs only $162.** A development system (W95), with a proto board, is only $275. JED has a local board/controller with LCD/Kbd and industrial I/O.

See our www site or call for data sheets.

RS232 to RS485 Converter

The small plastic case 100mm by 55mm by 25mm is an Australian-built RS232 to RS485 optoisolated converter. It connects a PC or PLC RS232 serial port to a multidrop RS485 differential cable up to 4,000 ft long.

The J995X converter has an internal microprocessor to automatically connect the transmitter to line, so the user program need not use the RTS line for RS485 TX control.

Cost $160 plus $20 plug pack.

$300 PC-PROM Programmer
Also: $145 Eraser with timer.

This programmer plugs into a PC printer port and reads, writes and edits any 28 - pin or 32 pin PROM without needing special plug-in cards.

JED Microprocessors Pty Ltd
www.jedmicro.com.au
173 Boronia Road, Boronia, 3155
Ph 03 9762 3588
Fax 03 9762 5499
(prices do not include freight or sales tax.)

PC-driven 'Lab in a Box'

Thurlby Thandar's GS2020 combines a two-channel 20MHz digital scope, a 2MHz digital function generator with arbitrary waveform capabilities and a four-output power supply in a single box, with all scope and generator functions (and one power supply output) controlled from a PC via the printer port. It comes complete with Windows software which allows you to use the instruments either individually, or together as an 'electronics lab in a box'.

BY JIM ROWE

FROM WHAT I'VE been able to gather, the GS2020 was developed as part of a cooperative project between manufacturer Thurlby Thandar Instruments (TTi) and Britain's Open University. TTi is of course a well established and highly respected British test instrument maker based in Huntingdon, Cambridgeshire.

Fairly clearly, the GS2020 was developed to provide a combination of the basic instruments needed by students for doing the experimental lab work involved in undergraduate and tech college electronics courses. Presumably the idea was to produce an 'electronics lab in a box' that could be made available to each student, either for use in the uni/college practical lab or perhaps booked out to them for doing their practical assignments at home.

The nett result is a reasonably compact (360 x 240 x 75mm) and portable (4.0kg) box containing most of the basic instruments needed for undergraduate lab work in basic electronics. There's a dual-channel DSO with a bandwidth of 20MHz (repetitive sampling); a synthesiser-type LF signal generator able to produce sine and square waveforms from 0.01Hz to 2MHz, and triangular waveforms from 0.01Hz to 100kHz, plus arbitrary waveforms from 0.02Hz to 20kHz — or a DC output programmable within the range +/-10V; and also a four-output power supply providing fixed outputs of +5V, +12V, -12V and a programmable 0 - 12V output.

Virtually all of these facilities are digitally controlled from a PC, using a standard Centronics-type parallel printer port and software (supplied) running under Windows 3.1 or 95/98. The only exceptions are the power supply's fixed +5V output, which remains on whilever the GS2020 is powered up, and the fixed +/-12V outputs — which are controlled via a small slider switch on the front panel, presumably to allow fast 'panic stop' removal of power from an experimental analog circuit in the case of wiring errors, etc.

In addition to these programmable analog resources, the GS2020 also provides a digital 'expansion port' via a DB25F connector on the rear panel. This makes available an 8-bit parallel input bus; an 8-bit parallel output bus plus 6-bit parallel control/address bus; and another programmable 'reference voltage' analog output, programmable in 256 steps with the full-scale range adjustable between 2.5V and 6.0V using a preset pot (accessible via a small hole underneath the case).

So there's quite a nice range of facilities for basic testing of simple electronic circuits. The performance of each section is fairly impressive, too.

For example each vertical channel of the DSO has a rated analog bandwidth of DC to 20MHz (-3dB), with a sensitivity range from 5mV to 5V per major screen division in the usual 1-2-5 range sequence. It uses 8-bit sampling, giving a vertical resolution of 256 levels (32 per major division). Input impedance is a standard 1MΩ//25pF, allowing the use of standard scope probes.

The maximum sampling rate is 20MS/s, which is also the maximum rate for single-shot operation. For repetitive sampling of continuous signals, this translates to an effective 2GS/s. The effective timebase ranges are 5us/div - 50s/div for 'transient' mode and 50ns/div - 2us/div for repetitive mode. Record length is 1024 samples, or 2048 with pre-trigger operation. The rated timebase accuracy is +/-0.01%, or +/-1% in repetitive sampling mode.

The triggering facilities are fairly basic, but flexible. You can select from CH1, CH2,

External or Line, positive/negative slope, with AC or DC coupling and an optional HF Reject filter (-3dB at 7kHz). Trigger level is variable over the full screen height, and you have a choice of Auto (default free-run) or Normal modes. You can also select either no pre-trigger data capture or a choice of 2.5, 5, 7.5 or 10 major screen divisions of pre-trigger capture.

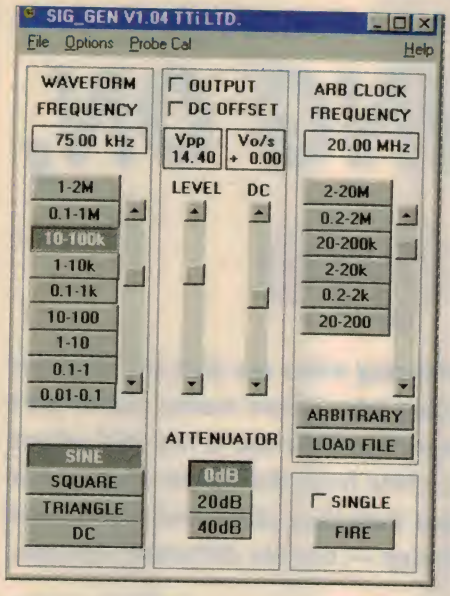
There's a choice of three basic acquisition modes: Run, Hold and Single shot, with the ability to perform averaging over from 2 to 256 acquisitions (binary steps), in Normal/Run mode.

The performance of the LF signal generator is also quite impressive. You can set the sinewave/squarewave frequency anywhere between 0.01Hz and 2MHz, in nine decade ranges — apart from the top range, which is 1 - 2MHz. Similarly the triangle wave output can be set to anywhere between 0.01Hz and 100kHz in seven decade ranges. Frequency setting resolution is 0.1% of the range in use, with an accuracy of +/-0.01% of setting.

Sinewave distortion (THD) is <1% up to 10kHz, with harmonics more than 25dB below the fundamental up to 2MHz; amplitude flatness is +/-0.5dB below 10kHz, and +/-1dB to 2MHz. The squarewave mark/space ratio is rated at 1:1 +/-0.1%, with rise and fall times less than 100ns. The rated linearity of the triangle wave output is better than 99%.

In arbitrary waveform mode the generator 'plays' waveform files prepared by a utility from Tabor Electronics called WaveCAD, which is supplied with the GS2020. Each waveform is stored as 1024 8-bit samples, and the sample clock can be selected anywhere between 20Hz and 20MHz in six decade ranges, with a resolution of 0.1% of the range. This gives a frequency range of from 0.02Hz to about 20kHz, with one period per record.

As mentioned earlier you can also set the



Here's the window for the 20MHz scope, which lets you control all of its functions as well as showing the display. It's all quite intuitive.

generator to produce a programmed DC output instead of a time-varying waveform, with the unloaded output programmable anywhere between -10V and +10V.

Output impedance of the generator is 50Ω, and you can vary the unloaded output amplitude between 20mV and 20V (10mV - 10V into 50Ω), in three decade (20dB) ranges. Within each range the amplitude can be adjusted with a resolution of 0.5% of the range, with a level accuracy of +/-5% +/-1mV at 1kHz into 50Ω.

By the way the generator also has an auxiliary TTL/CMOS output, delivering a squarewave of the same frequency and phase as the main output, for scope triggering etc. The main output can also be switched to provide a 1Vp-p 1kHz squarewave 'calibration output' for frequency compensation of scope probes, etc.

The GS2020's power supplies are quite well rated, too. The fixed +5V supply is rated at 500mA, with an accuracy of +/-0.2V and a load regulation of better than 1%; the +/-12V supplies are rated at 200mA, with an accuracy of +/-0.5V and a load regulation of again better than 1%. The +5V and +/-12V supplies are fully floating with respect to system 0V (ground), by the way.

The programmable 0 - 12V supply is rated at 100mA maximum, with a setting resolution of 50mV, an accuracy of 0.5% +/-50mV and a load regulation of better than 1%.

As you can see, then, the facilities and performance built into the GS2020 should make it very suitable for basic electronics lab work. It comes with a small user manual, mains and printer port connection leads, and two 3.5" floppies with the software: one for the suite of GS2020 Windows control utilities, and the other with Tabor's WaveCAD 3.1T arb waveform design software.

What we found

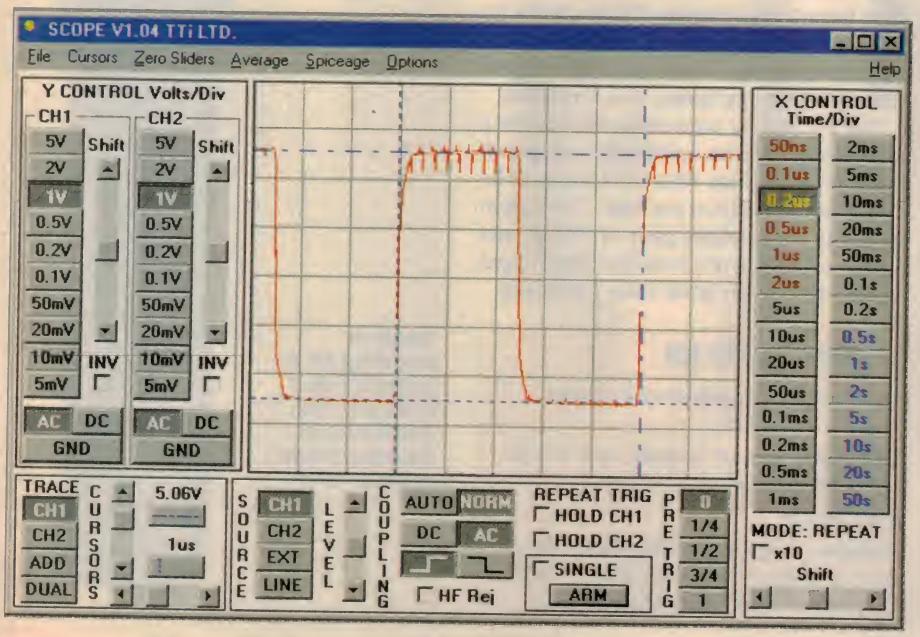
Distributor Emona Instruments sent us a sample of the TTi GS2020 kit, which we tried out in conjunction with an HP Pavilion 6305 PC (266MHz AMD K6) running Windows 98.

We had no problems installing the software, and once the main suite was installed and fired up it had no trouble finding the GS2020 hooked up to the Pavilion's one and only printer port. (It can easily be set for other port addresses, though.) We were very soon able to try out the various instruments inside the GS2020, both with each other and other external instruments — to check their performance.

There was no problem running the various instrument control utilities at the same time, by the way. On the Pavilion this didn't even seem to produce any penalty in terms of response speed — but you might perhaps notice this on slower Pentiums or 486 machines. A 25MHz 386SX is the recommended minimum hardware configuration.

We were able to check most of the basic performance parameters for the DSO, generator and power supplies, and almost all were within spec — generally quite comfortably so. For example the DSO vertical bandwidth was only about 1dB down at 20MHz, and the frequency accuracy of both the DSO and generator were well within the rated 0.01%

(Continued on page 43)



This is the corresponding window for the 2MHz function/arb generator. In function mode it generates sine, square and triangular waveforms.

SOLDERING ON, butane style

Gas-powered soldering irons are just the shot for soldering and heating jobs where mains power isn't available. We recently checked out a few mid-priced examples on offer from the larger electronics retailers, and found that they all represented good value-for-money — but for different reasons.

BY ROB EVANS

If you need to do a soldering job within a stone's throw of a mains power point, the usual approach is to drag out your favorite soldering station and a bunch of mains extension cables, connect it all up, complete the job, pack the whole lot up again, then hope that haven't missed any solder joints in the process. This is all quite possible — although less than ideal — if the job is reasonably close to a power point, but when it comes to truly remote soldering jobs the obvious solution (barring kilometre-long extension cables) is to use a portable self-powered tool.

In this arena, butane gas-powered soldering irons win hands down over the opposition. There's NiCad-powered irons, basic 12V units you can connect to a vehicle's battery, plus of course 240VAC generators and inverters to power a conventional iron, but in terms of size, performance and flexibility a butane-powered iron is streets ahead. It's those features that make gas irons ideal for remote servicing, marine and automotive applications, alarm system installation, plus a host of other jobs where the user is on the go.

Scanning though electronics engineering catalogues will turn up a wide range of butane-powered irons, with models and accessories to suit just about any job. We tested a few examples in the $80 to $90 price bracket, to give you a taste of what's on offer.

Vulkan P100 soldering kit

The Vulkan gas soldering kit is a nicely packaged setup based on a Vulkan P100 butane iron, with an equivalent heating rating of 10 to 60 watts — as set by a recessed regulator slider arm in the upper section of the barrel. Its refillable gas cylinder is made from a translucent material so you can easily judge the current gas level, while its capacity is rated for up to 90 minutes of continuous use.

On test, we had some difficulty in getting the unit started using the supplied flint lighter (built into it's cap) until we realised that the unit ignited most easily when set to a very low gas output setting — otherwise, it had a tendency to blow itself out. When underway with the catalytic converter taking over, the Vulkan P100 came came up to temperature very quickly and maintained its heat well during soldering jobs. We suspect that the 90-minute gas tank rating would be somewhat less when the unit is driven hard, by the way, but even a lower figure would be fine for most remote work.

Along with a conventional pointed soldering tip, the Vulkan kit also includes a hot-air tip (ideal for heatshrink tubing), a 'hot knife' tip (a large wedge-shaped affair), a flame tip (no catalytic mesh), plus an aluminium tray and wetting sponge — the flame tip was particularly hard to get going, as it turned out.

The iron and its accessories are held in a small steel carry case, making this setup well suited to mobile use where it's likely to be tossed into a tool kit or car boot. The Vulkan kit has an all-up asking price of $89.95, and thanks to its range of accessories plus rugged construction, offers good value for money.

Vulkan P100 kit

Good points: Translucent gas cylinder. Rugged construction.

Bad points: Difficult to ignite, until you get the technique right.

RRP: $89.95

Available: Jaycar Electronics stores. See their catalogue for more details, or check the Jaycar website: **www.jaycar.com.au.**

Vulkan's soldering kit is based on their P100 gas iron, which has an equivalent heat rating of 60W.

The Weller P-1K has very similar specs to the Vulkan P100, and is the core of Weller's Portasol pocket soldering kit

Weller Portasol P-1K kit

As it turns out, the Weller 'pocket' soldering system is almost identical to the Vulkan kit in its ratings, features *and* price; $89.80. In this case the iron's temperature is set by a rotating knob-style regulator set into the base of the cylinder, which offered a very smooth control over the gas output. The cylinder itself is made from a more conventional opaque material unfortunately, so there's no real clue as to the Portasol's current gas level — both brands are quite easy to fill, however.

The Weller kit is housed in a small moulded plastic carry case, which holds the iron, wire stand, wetting sponge, and three spare tips — these are the familiar hot blower, blow torch and hot knife fittings. The blow torch adaptor was particularly effective in the Weller kit, which seemed to be able to put out an extraordinary degree of heat for it's size, although as before, we suspect that the gas tank time capacity rating would drop significantly when driven this hard.

All in all, the Weller kit seems a nicely designed and constructed soldering system that performs its job without fuss. It's reasonably easy to ignite using the supplied lighter (again, built in the iron's cap), comes up to temperature quickly, and the accessory tips perform their specialised tasks well.

Weller Portasol P-1K kit

Good points: Strong output. Smooth regulator action. Very easy to use.

Bad points: Slight binding in the tool attachment thread.

RRP: $89.80

Available: Dick Smith Electronics. See their catalogue for more details, or check the DSE website: **www.dse.com.au.**

Iroda 120W gas iron

The Iroda gas iron is quite a different beast to the Vulkan and Weller kits, and is an interesting contrast to the complete soldering system approach of those setups. While there is in fact an Iroda kit offering similar features, price and ratings to the other two, the 120W iron we're looking at here demonstrates what a similar outlay will buy in the range of larger, more powerful units.

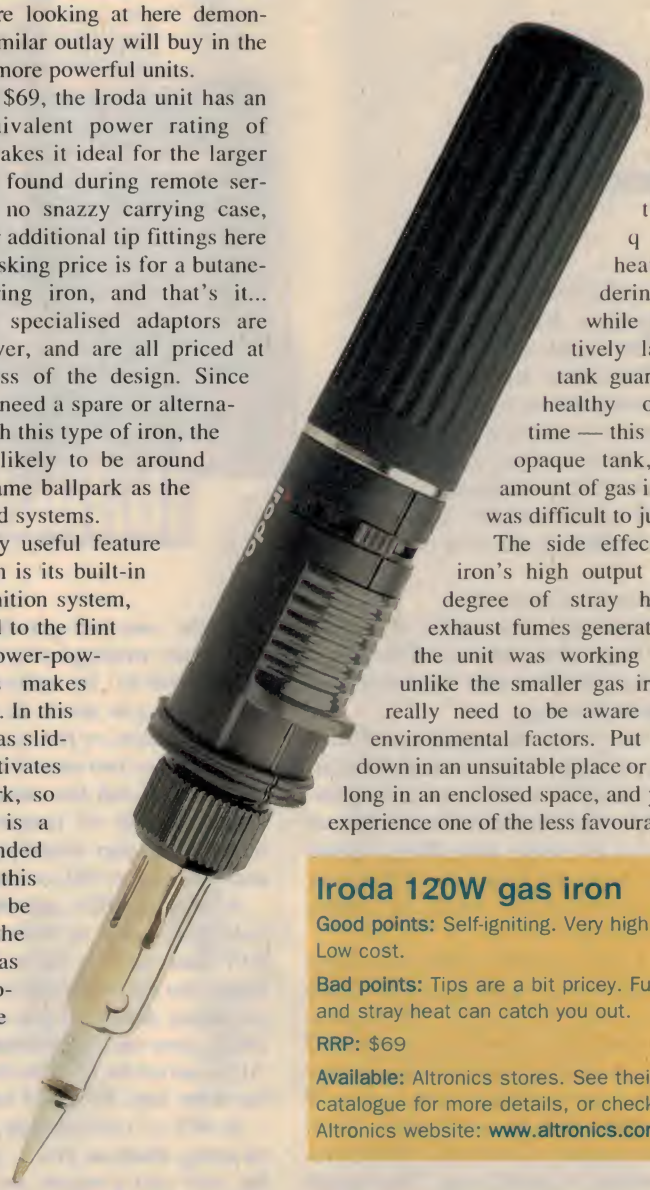
Priced at just $69, the Iroda unit has an impressive equivalent power rating of 120W, which makes it ideal for the larger jobs commonly found during remote servicing. There's no snazzy carrying case, stand, sponge or additional tip fittings here though, so the asking price is for a butane-powered soldering iron, and that's it... Extra tips and specialised adaptors are available however, and are all priced at $17.95 regardless of the design. Since you'll probably need a spare or alternative style tip with this type of iron, the overall cost is likely to be around $86 — in the same ballpark as the smaller kit-based systems.

One extremely useful feature of the Iroda iron is its built-in piezoelectric ignition system, which compared to the flint setup in the lower-powered kit irons makes starting a breeze. In this case the usual gas slider valve also activates an ignition spark, so using the unit is a truly one-handed affair. It's a pity this system couldn't be included in the smaller irons, as their lighting procedure is quite cumbersome by contrast.

As expected, the brawny nature of the Iroda iron helped it cruise though quite heavy soldering jobs, while the relatively large gas tank guaranteed a healthy operating time — this too is an opaque tank, so the amount of gas in reserve was difficult to judge.

The side effect of the iron's high output was the degree of stray heat and exhaust fumes generated when the unit was working hard, so unlike the smaller gas irons, you really need to be aware of these environmental factors. Put the unit down in an unsuitable place or work too long in an enclosed space, and you soon experience one of the less favourable legacies of gas irons.

Overall though, the Iroda 120W is a very useful butane-powered iron at a respectable asking price. If your soldering needs are quite specific and a higher power is called for, this might well be the ideal gas iron for the job.❖



Big and beefy when compared to the smaller kit-based irons, the Iroda 120W has a high heat output plus a piezo starting system.

Iroda 120W gas iron

Good points: Self-igniting. Very high output. Low cost.

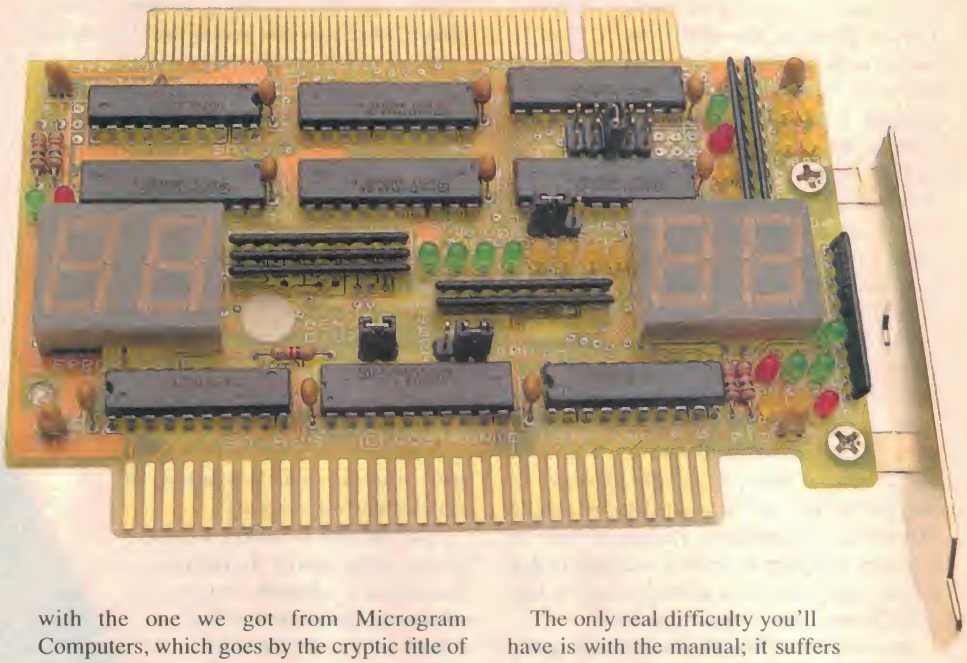
Bad points: Tips are a bit pricey. Fumes and stray heat can catch you out.

RRP: $69

Available: Altronics stores. See their catalogue for more details, or check the Altronics website: **www.altronics.com.au.**

Send me a POST Card

Is your PC on the blink? What you need are some diagnostic tools to see what's wrong, and a POST Card is perhaps one of the most comprehensive PC diagnostic tools around. While it won't actually fix the problem, it will help you home in on the culprit - like that dodgy video card you just installed.



BY GRAHAM CATTLEY

YOU SWITCH ON your PC, and regular as clockwork it springs to life making all those familiar whirrs, clicks and beeps. After a few seconds the screen wakes up, and you see a quick RAM check followed by burst of activity as the various system BIOS messages scroll past, before your computer launches into the wonders of the main operating system.

Well, it does on a *good* day.

On a *bad* day, you switch on, and... Nothing. Dead. Blank screen, which matches your blank mind as you try to work out just what went wrong...

If you are lucky, the machine will have woken up enough to emit a series of beeps, in a vain attempt to inform you of the problem. When you look these beep codes up though, you are more then likely to find that you have a 'Processor failure' or 'System timer failure', which isn't much use at all, really.

There is help, however. Built into every motherboard is a self-check procedure called POST, for Power On Self Test. This is essentially a counter that is incremented as each of the 150 or so tests and initialisations are performed every time you boot up the system. If your computer dies, all you have to do is look at the counter, and see how far the system got before it keeled over. This should then give you a pretty good idea of where the problem lies.

POST Card

If you want to see the POST code on your dead computer, you are going to need a POST Card, and we were quite impressed with the one we got from Microgram Computers, which goes by the cryptic title of the CV04P-Ix. Its radical double-ended design lets you use it in either the usual ISA/EISA slots, or the more up to date PCI slot. It boasts two sets of numeric displays, one for ISA and the other for PCI, and a couple of sets of jumpers to select the required I/O port (usually port 80 for ISA and PCI, or port 300 for some EISA slots).

A forest of LEDs indicate the state of the four power rails, as well as the RDY and RST lines, and for the real tech-heads out there, you can even read the error code off the binary display. If you really want to get into it, you can enable/disable the ISA bus AEN, and set the PCI bus check point decoding delay time, but you'd have to be keen...

In 99% of cases though, you don't have to worry about all this — you simply drop the card into a vacant slot, switch on the system, and read off the displayed code. You then look up the code in the supplied booklet, and read off the test that was being performed when the system died. This should help you point the finger at the culprit and with any luck you'll be able to get the system back on its feet.

The only real difficulty you'll have is with the manual; it suffers in the translation from Chinese, and seems to cover around 20 related cards. It doesn't matter though, as you'll only really be interested in the separate Error Code Message booklet, covering AMI, Award and Phoenix BIOSes.

All up the CV04P-Ix is a good thing, and if you are in the PC repair business, it is well worth the asking price. ❖

CV04P-Ix POST Card (Cat# 3362)

Good points: *works in ISA, EISA or PCI slots.*
Bad points: *You'll have to decipher the manual.*
RRP: *$249 (inc. tax)*
Available: *MicroGram Computers, P.O. Box 202, Tumby Umby, NSW 2261. Phone: (02) 4389 8444; Fax: (02) 4389 8388; Email: info@microgram.com.au; website:* ***www.mgram.com.au.***

MicroGram Computers

Windows Terminal

This windows based terminal is suitable for both NT Terminal Server & Citrix Metaframe as well as being configurable for Unix hosts. It supports Microsoft's RDP and Citrix ICA3 protocols. In addition, it also emulates a number of standard terminals. Ports provided include DB25 parallel port, two DB9 serial ports, two USB ports, VGA DB 15, PS/2 mouse & keyboard ports & audio in & out. It is used in conjunction with a standard monitor, keyboard & mouse.

Cat. 1214 **Windows Terminal** $1299

Serial and TCP/IP Ethernet LAN terminals.

Cat. 1026 **Serial Terminal 115.2Kbps** $469
Cat. 1133 **Serial Terminal 460Kbps** $489
Cat. 1104 **TCP/IP Ethernet LAN Terminal** $499
Cat. 1134 **TCP/IP Ethernet LAN Terminal with LPD** $519

10/100BaseTX Ethernet Switches

Each port on these 8 & 16 port switching hubs is a 10/100 BaseTX auto negotiation port which supports half & full duplex transmission. If your network has continual collisions (with consequent drop in network performance) this hub will switch a dedicated path between the sending & receiving computers thus preventing collisions and improving performance & usable bandwidth.

Cat. 11322 **Ethernet Switch Hub 8 Port 10/100BaseTX** $459
Cat. 11323 **Ethernet Switch Hub 16 Port 10/100BaseTX** $899

Ultra DMA 66 HDD PCI IDE Controller

Break the 8.4Gb drive barrier and get a lot more speed. Our Ultra DMA66 IDE controller has two enhanced Ultra DMA 66 IDE ports, it supports up to 4 IDE devices and co-resides with existing motherboard IDE ports i.e. 8 IDE devices on one computer. The performance improvement is dramatic!

Cat. 2809 **HDD Cont PCI IDE Ultra DMA 66** $159
Cat. 2632 **HDD Cont PCI IDE Ultra DMA 33** $149

Web-Based Training from $14.95 per month*

New courses now available! Including Windows 98, Quicken 98, Lotus Notes, Internet Tools (Netscape) and more courses on TCP / IP.

A number of courses are "Microsoft Certified Professional - Approved Study Guides"

*Full details at www.tol.com.au

Now over 200 courses on offer

Dual Speed IP Gateway Hub

An internet access server and an 8 port UTP network hub all in one box. Two RS232 ports allow two modems to be connected to provide additional bandwidth to the internet. Each UTP port is a 10/100 BaseTX auto negotiation port. All stations on the network have simultaneous access to the internet. A hardware based firewall ensures security, while dial on demand minimises connect time. It also has a built in DHCP server. The 2nd modem can also be configured for incoming calls.

Cat. 10108 **Dual Speed IP Gateway Hub** $699

A dual port Internet Access Server is also available. The second line can be set to dial when the first line reaches a nominated percentage of full load. UTP and BNC connectors are provided.

Cat. 10112 **Dual Port Internet Access Server UTP/BNC** $559

Rack Mount Industrial Case (PCI/ISA)

Provides up to 14 slots, 2 x 5.25" and 2 x 3.5" drive bays, this 19" case supports a number of different backplanes. Other features include, a ball bearing cooling fan and a hold-down clamp for plug-in AT or XT cards. It can accomodate either an industrial 350W or standard 300W power supply. The ATX case model includes a 250W ATX power supply.

Cat. 17055 **Indust. Case 19" Rack 14 slot Passive BP** $899
Cat. 17056 **Passive Backplane PCI/ISA 14 slot** $229
Cat. 8895 **Indust. Power Supply 350W PS/2 AT** $365
Cat. 8894 **Power Supply 300W PS/2 AT** $175
Cat. 17058 **Indust. Case 19" Rack 14 slot ATX M'Board** $1150

Industrial CPU Card

A full size industrial CPU card which supports Pentium II Celeron CPU. The card provides support for 512MB EDO/SDRAM, four IDE drives/devices, two floppy drives, one RS232 serial port, one selectable RS232/422/485 port, one SPP/EPP/ECP parallel port, two USB ports, VGA display & 16 level watchdog timer.

Cat 17057 **Industrial Full Size CPU Card (no CPU)** $1230

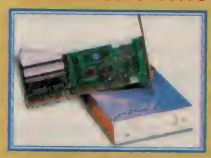
Year 2000 BIOS Card

This card carries the NSTL "Compatibility Test" seal.

Even Pentium motherboards are not immune to the Y2K bug! This Year 2000 BIOS Card solves the problem of progression from 1999 to 2000 as well as 21st century leap years & also double-buffered to take care of the Crouch-Echlin effect.

Cat. 3359 **Year 2000 BIOS Card** $129

PCMCIA Card Drive for Desktop PC



This high performance PCMCIA Drive provides two front-access sockets on the 3.5" front bay and is connected to the Interface Adapter by ribbon cable. The drive supports DOS & Windows 3.1x, Windows95/NT 3.5x & 4 and OS/2 Warp 3.0 & 4.0.

Cat. 6121 **PCMCIA Card Drive for Desktop PC** $219
Cat. 6458 **PCMCIA Card Drive & FDD** $399

Digital "Film" Reader/Writer

Transfering images from your digital camera can be S-L-O-W. These reader/writers connect to your parallel port & appear as another "drive" in Windows Explorer.

Cat. 6459 **Compact Flash Card Reader / Writer** $189
Cat. 6603 **Smart Media Card Reader/Writer** $279

Remote Power Control Kit via Internet

Control computers, swimming pool pumps, security lighting, heating, cooling etc. over an intranet or the internet. The kit includes a PCI PnP Digital I/O interface card, power control box & eight-in-one connecting cable. Fully functional demonstration software, with source code in VB and C++, is included as well video monitoring software.

Cat. 17064 **Remote Power Control Kit via Internet** $579

E & O E All prices include sales tax **MICROGRAM 1099**

Online catalogue & shop at www.mgram.com.au

Phone: (02) 4389 8444 sales@mgram.com.au info@mgram.com.au Fax: (02) 4389 8388

Dealer Enquiries Welcome

Australia-Wide Express Courier (To 3kg) $10

We welcome Bankcard Mastercard VISA Amex

Unit 1, 14 Bon Mace Close, Berkeley Vale NSW 2261

Web site: www.mgram.com.au

FreeFax 1 800 625 777

Vamtest Pty Ltd trading as MicroGram Computers ACN 003 062 100

FreeFax 1 800 625 777

iReady's Internet vision

Internet-compatible soft toys, white goods and kitchen appliances? What's the world coming to? Precisely that, according to the US-based start-up — or is that up-start — company iReady.

BY ROB EVANS

Ask someone twenty or even ten years ago to imagine how a communications revolution might look in the future, and they probably would have described a world geared to sophisticated *personal* communications — perhaps with us all wearing Star Trek style communicators, or even transceiver wristwatches. The revolution's well and truly here of course, but in a much broader sense than we could have guessed back then, where sprawling communications *networks* have ended up playing a much larger role than direct point-to-point contact.

It goes without saying that the biggest and fastest growing communications network today is the big daddy of them all; the Internet — that unruly, anarchic global computer network that (so far) has defied government control or significant industry exploitation. Rambunctious it may be, but the Internet is the ideal medium for passing all manner of data between both people and machines, mainly thanks to its standardised communications protocols and low connection costs.

While our most familiar contact with the Internet is on a personal level through web browsing and email exchange, there's no real reason why less sophisticated (that is, dumb) entities can't make use of the network as well. It's exactly this idea that's driven the Silicon Valley-based iReady Corporation to champion the rights of mainstream consumer products to have Internet access, and in the process promote its own efficient hardware-based way of doing just that.

Web browsing and email on a chip! Seiko Instruments have developed the S7600 iChip for their 'Internet Ready' Smart LCD range, which has been designed for handheld devices such as cellular phones, pagers, PDAs and digital cameras.

The Internet Tuner

The most common way of connecting to the Internet is through a computer, its peripherals (modem, LAN, etc) plus several layers of complex software (network, communications, and web/email protocols, plus an operating system). While this is a convenient setup for a general-purpose PC equipped with generous amounts of memory and processing power, it's a very inefficient way of doing just that one, dedicated job — in those terms, it's large, power hungry and worst of all, expensive.

iReady's answer for a dedicated *efficient* Internet connection is its Internet Tuner design; a collection of logic block designs that can be put together in one chip (ASIC or otherwise), with the modules chosen or 'tuned' to suit the application.

iReady's Internet Tuner evaluation kit plugs into a PC's standard ISA slot, and includes the i-1000 chip plus all source code and API documentation needed for developing applications.

For example, a consumer product featuring a text-based email reader would need a low-level PPP (Point to Point Protocol) layer block, an IP (Internet Protocol) layer, a TCP (Transmission Control Protocol) layer, plus a POP3 block for a Post Office Protocol V.3 email system. These layers and several more are available as function blocks in iReady's Internet Tuner design, which in its first release, is able to supply a basic Internet connection right though to simple HTML web browsing.

It may sound a little convoluted, but the end result is a small dedicated chip that provides the exact type of Internet connection needed in a very efficient and cost-effective (in mass production) way. The consumer appliance manufacturer just needs to add the low-end connection into the network, such as a modem or ethernet card (although this can be included), plus a suitable output display and control interface. This interface would typically be

based on a relatively slow 8-bit processor and a small amount of RAM, by the way.

In the real world

iReady are an example of the new breed of 'chipless' companies in Silicon Valley, who typically develop and deal in intellectual property (IP) though licensing agreements. They've already signed with major Japanese manufacturers Toshiba and Seiko however, which has resulted in chips from both companies featuring iReady's Internet tuner modules.

Seiko Instruments — specialists in LCD manufacture — have produced a range of compact internet-equipped LCD screens aimed at devices like screen-phones (will they *ever* catch on?), cellular phones and internet compatible electronic games. The modules are reportedly very power efficient, and both Seiko and iReady have great hopes for the future of these OEM products.

The point is perhaps, is the public ready (excuse the pun) for this level of Internet accessibility, and will the manufacturers move beyond what many would consider as gimmicky applications? iReady may well have this one covered too, as they've been making a concerted effort to trumpet the value of other Internet equipped appliances, including Internet-ready fax machines — the so-called iFax.

This is indeed an interesting application, since in simple terms, it promises international faxing via the Internet at local call rates. As the major fax and MFC (Multi Function Centre) manufactures can add Internet fax capabilities to their products for very little added cost — the Seiko and Toshiba chips would apparently add less than $US10 — at the very least, they'll be including a significant, marketable feature to attract customers to their products.

The practical aspects of the iFax may not be quite that straightforward though. The difficulty with this approach is that iFax machines equipped with a dial-up internet connection can happily send faxes off into the global network, but the matching machine at the other end can't receive that fax until it too dials up, to make the link at some intermediate point.

Leaving the iFax machine permanently on-line to the ISP means it can't be dialed to receive conventional faxes, plus of course, that line would need to be assigned a permanent IP address by the ISP so that machine could be found on the web. This would also be the case if the machine just dialed up on a regular basis to see if any faxes had arrived. All in all, messy...

A less-than-glamorous iFax machine (left) produced by iReady to demonstrate the capabilities of Internet faxing. It's based on their Internet Tuner evaluation kit, the core of which is Toshiba's low-cost i-1000 ASIC shown here on the right.

The answer though is with a number of internet-based companies that offer a full internet faxing service, where for a fee, their global network can send your fax data to a major city where their local fax 'robot' dials up the receiver's fax machine, and delivers the fax in the conventional way — and then sends you a 'fax received' confirmation email! The end result is not really the bargain promised by the iFax idea, but generally works out to be less outlay than the equivalent international call charge.

That furry, microprocessor-based ball of fur we all love to hate may soon be communicating via the Internet. iReady's low-cost and very power-efficient hardware approach to Internet connectivity is ideal for battery-powered, mass-market products such as toys and handheld electronic games.

An ethernet LAN equipped iFax machine is a different situation however, since direct (almost) real-time international faxing is possible when the local network's mail system has been correctly setup. So far, such machines occupy the upper end of the fax machine market, and command a matching up-market price. To find out more, check out Panasonic's sophisticated DX-1000 network fax, or their more affordable KX-FP250 dial-up version.

The future

In the end, it's difficult to tell if the public will embrace the idea of internet-connected everything, as the folks at iReady are keen to predict. We're likely to see TCP and email-equipped cellular phones, PDAs, and a host of other handheld devices sometime in the future, but these may well stay in the gadget-orientated Japanese market. There's certainly a huge potential for the technology away from consumer orientated products, particularly in the area of industrial control, fault reporting and remote diagnosis.

On the other hand it may all resolve down to the (arguably) lowest common denominator of gimmicky toys and games that can connect to the manufacturer's website for purchased software upgrades. Perhaps we'll see the day when the kids' Furby MkIV waddles over to the nearest Internet wall socket, plugs itself in then jabbers on in a self-satisfied way as it downloads Service Pack 134 — a truly frightening thought...❖

Jaycar ELECTRONICS OCTOBER SALE

Prices valid until End October 99

As easy as ordering a pizza! TECH Store JAYCAR IN CYBERSPACE www.jaycar.com.au 1800 022 888

OVERNIGHT DELIVERY

Reversing and Parking Sensor

NEW

This is an automatic alert alarm. It gives a safety warning which tells the driver the distance between the rear of the vehicle and any object in the path of the reversing vehicle. The ultrasonic sensor detects the available remaining distance to an obstacle and provides a four stage audible (and visual) warning to the driver. The four stages are 1.5 - 1.0m, 1.0 - 0.6m, 0.6 - 0.4m and below 0.4m. Supplied with one sensor, cabling, installation hardware and instructions. LR-8860

Only $89.95

500,000 Candle Power Rechargeable Spotlight

NEW

This hand held mega bright spotlight operates from a 6V 4AH rechargeable sealed lead acid battery. Its supplied with a 240V plugpack recharger and a lead to charge it from a car cigarette lighter. The battery is easily removed, so 2 or more could be kept charged for longer use. Provides up to 20 minutes continuous use from 1 battery. Extra batteries; Cat. SB-2496 $19.95 each. Trigger lock allows for hands free operation. Halogen globe. Brighter than a car headlight. ST-3030

Only $45

Jaycar Platinum CDR's

NEW

These CDR's, are silver/silver, 74 minute 650mB. Great value!!

- **1 Disk $2.85** Cat XC-4715
- **10 Disks $24.50**
- **100 Disks $235**

Supplied in Jewel case

Bulk Pack Not in Jewel case

- **1 Pack** Cat. XC-4716 **(10 Disks) $22.50**
- **10 Packs (100 Disks) $210**

Avalon Rewritable CD

74 minute 650mB. XC-4720

- **Only $7.95ea.**
- **10 Plus $6.95ea.**

DMM Multifunction Test Probe

This probe replaces the positive test lead and is compatible with any digital or analogue multimeter. Features include: •LED light for seeing in dark corners •Easily find the positive wire in a circuit •Distinguish positive and neutral in a mains socket •Check earthing of electrical appliances •Check for incorrect wiring of electrical appliances. •Voltage rating: 1000VAC •Current rating: 10A •Test lead length: 1.2m •Plug: Right angle banana. Cat. QP-2250

NEW

$8.95

Coax Crimping Tool Kit

Cat. TH-1878

Includes one crimper, with 5 interchangeable dies, cable cutter, coax cable stripper, screwdriver and case. Crimps an enormous range of coax cables - See Cat. page 136 for details.

Cat. Price $169 Oct. $129 Save $40

Long Cat 5 Patch Leads

NEW

With RJ45 plugs with boots each end. ACA approved. All are blue in colour.

Description	Cat.	Price
10 Metre	YN-8105	$22.95
15 Metre	YN-8106	$31.95
20 Metre	YN-8107	$39.95
30 Metre	YN-8109	$44.95

Also available:
2 Metre Crossover Lead - Black YN-8172 $12.95

Mini Vacuum Attachment Kit

Connects to your home vacuum cleaner, and has lots of small nifty bits to clean in hard to get places.

Cat. Price $23.95
Oct. $16.95 Save $7

Cat. XV-5060

Economy Magnifier Lamp

NEW

This magnifier lamp has a 95mm dia. magnifying glass and requires a 60 watt globe for illumination. It has an adjustable head, and can be extended to almost 1 metre. An on/off switch is located on the cable, and it can be clamped to a desk up to 35mm thick. Cat. QM-3528

ONLY $39.95

Desk Mount Magnifier Lamp

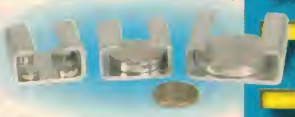
NEW

New Model, More Features, Lower Price!!

New model features a clear plastic cover over the 22W flouro tube, so it cannot be accidentially hit & broken, and a flip up cover for the magnifying glass, because they should not be left in the sun. On/Off switch is on the head, and the magnifier itself is a 3 diopter lens. Cat. QM-3526

A Bargain At Only $79

Save on Rare Earth Neo "Scary Magnets"



Incredibly strong magnets. Nickel coated, and supplied in a iron shielded keeper.

Dia.	Height	Qty	Cat #	Was	October	Save
10mm	3mm	4	LM-1622	$9.95	$6.95	$3
25mm	5mm	ea	LM-1618	$14.95	$9.95	$5
35mm	5mm	ea	LM-1620	$22.95	$16.95	$6

Save On Ni-Mh Batteries SAVE!!!!

Description	Cat.	Norm	Buy 4	Buy 10
AA 1000mAH Nipple	SB-2455	$4.25	$3.50ea	$3.00ea
AA 1000mAH Solder	SB-2457	$4.50	$3.75ea	$3.25ea
AAA 550mAH Solder	SB-2430	$4.50	$3.75ea	$3.25ea
AA 1300mAH Nipple	SB-2438	$5.25	$4.50ea	$4.00ea
AA 1300mAH Solder	SB-2439	$5.50	$4.75ea	$4.25ea
SUB C 2500mAH Solder	SB-2432	$9.95	$8.50ea	$7.95ea

And Ni-Cads

We won't be beaten on price

AA 600 mA Solder				
	SB-2452	$2.25	$1.90ea	$1.55ea
AA 1000 mA Solder				
	SB-2440	$3.75	$3.00ea	$2.50ea

Ultimate Remote Control with Backlight

Will replace up to 8 remote controls. There is a different LCD display for each piece of equipment used. Limited quantity. Cat. AR-1725

Was $179.50
Oct. $149.50
Save $30

Fast Ni-Mh Battery Charger

NEW

At last a charger specifically designed for Ni-Mh batteries. Features •Will charge 2 or 4 pcs. AA or AAA rechargeable NI-Mh batteries •Fast Charge - 5 hours •LED lamp indicates fast charge and trickle charge •Auto selects the correct charge rate for AA or AAA •Plugs directly into 240V mains power point. Cat MB-3509

$39.95

Buy the Charger in October, and for an extra $8 you can buy 4 x AA 1300mA Ni-Mh batteries worth $18

Jaycar will match or better the price of any product our competitors sell, provided the goods are in stock, and of the same quality. Sale prices included

MAILORDERS - FREECALL FOR PHONE ORDERS - 1800 022 888

OVERNIGHT DELIVERY

MAILORDERS - FREECALL FOR PHONE ORDERS - 1800 022 888

Video Balun Bargain

CRAZY PRICE

Video Baluns simplify CCD cabling, and increase transmission distance without the need for video amps. Using unshielded twisted pair cable transmission distance is up to 600 mtrs. for B/W and 300 mtrs. for colour. One balun is required each end. BNC plug on 200mm lead for input, output by 2 screw terminals or RJ12 skt pins 4 & 5. Visa versa for other end - 2 needed - one each end.

Cat. QC-3425
Now Only $12ea

RG59 75 ohm Gas Injected Foam Coax

NEW

Brand new generation TV Coax. Has both a braid and foil, which provides 100% shielding. Won't get water logged underground. Also includes metre marking. Cat. WB-2004

$1.20mt. or $80 per 100mt. roll

RJ11 4/4 Phone Plug

NEW

Packet 10. Not ACA approved. Pkt 5 approved cost $3.25. Limited quantity avail. Cat PP-1429

Only $2.50

12mt Mains Extension Lead

12 metres long. Orange cable, 10 amp. Cat. PS-4140

$14.95

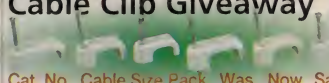
Black & White Bullet CCD Camera

NEW

Housed in a rugged case, with adjustable mounting base. Its waterproof, ideal for mounting under the eaves to keep an eye on the pool, backyard, driveway etc. etc. Size 74(L)x21.5mm dia. Requires 12V regulated plugpack MP-3030 $32.95 Cat. QC-3464

$169

Cable Clip Giveaway

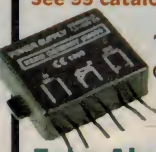


Cat. No	Cable Size	Pack	Was	Now	Save
HP-0660	11x4mm	25	$1.95	$1	$0.95
HP-0661	11x4mm	100	$5.95	$3	$2.95
HP-0663	13x6mm	25	$1.95	$1	$0.95
HP-0664	13x6mm	100	$5.95	$3	$2.95
HP-0666	20x8mm	25	$1.95	$1	$0.95
HP-0667	20x8mm	100	$5.95	$3	$2.95

SAVE ON KWIK KIT MODULES

KwiK Kit

See 99 catalogue p22 for full details



1.2V-30V@2A Variable Power Supply

Cat. AA-0240 was $34.95 save $10 **Oct $24.95**

Fake Alarm

Cat. AA-0280 was $12.95 save $4 **Oct $8.95**

Auto Battery Charger 1.2V-18V

Cat. AA-0250 was $34.95 save $10 **Oct $24.95**

12VAC 50W Dimmer For Halogen Lamps & Motors

Cat. AA-0319 was $39.95 save $10 **Oct $29.95**

12VAC 50W Flasher For Halogen Lamps

Cat. AA-0300 was $39.95 save $10 **Oct $29.95**

Halogen Music Light

Cat. AA-0314 was $24.95 save $8 **Oct $16.95**

EQUATOR Full Feature Car Alarms

See 99 cat page 81 for full details.

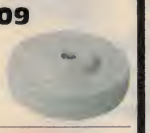
Equator 260

•Blackbox electronic module •2 transmitter key fobs •Ignition cut out relay •Shock sensor •Wiring •Mini Size Siren Cat. LA-8940 **$189**

Equator 260 Back Up

•Blackbox electronic module •2 transmitter key fobs •Ignition cut out relay •Shock sensor •Wiring •Mini Size Back up Battery Siren Cat. LA-8950 **$209**

Buy either in October and receive FREE A Supersonic Moth Repeller A great non chemical way of keeping moths out of your wardrobe. Cat YS-5530 Catalogue price $29.95



Indoor TV Antenna /Amp

Save $10

Plugs directly into power, and has second input socket for a TV game etc. Gain 24dB VHF, 20dB UHF. Cat. LT-3135

October $47.95 Was $57.95

Rechargeable Lantern Torch

Includes torch, 5AH SLA battery and 240V charger. See Cat. page 236. Cat. ST-3081

Normally $59.95 Oct. $49.95 Save $10

Phantom Power Supply Kit for Mics and DI Boxes

See EA June 98 and Cat. page 6. Cat. KA-1808

Save $5

Was $19.95 Oct. $14.95

Stereo Preamp Control Kit

See SC April 95 and Cat. page 5. Cat. KC-5182

Save $10

Was $49.95 Oct. $39.95

AMP-KING 4 Way Gold Fused Distribution Block

Cat. SZ-2072

3 x 4GA in, 4 x 8GA out.

Save $10

Was $32.95 Oct. $22.95

25W Pro Soldering Iron $32.95

Cat. TS-1550

13.8V DC Regulated Heavy Duty Power Supplies

These rugged power units are ideally suited for powering CB radios, communications receivers, garden lighting and other devices.

5A	Cat. MP-3072	$129
10A	Cat. MP-3074	$169
15A	Cat. MP-3075	$199

NEW NOW AVAILABLE

IT LOOKS LIKE A PIR, BUT ITS NOT!

NEW

This brand new B&W CCD camera looks just like a PIR. What a great way to Disguise the camera! Includes special CCD pinhole board camera module, audio, PIR mounting. Bracket and is supplied with line sockets for video, power and audio connections. Size 120(h)x 70(w)mm. Cat. QC-3479

$149.50

Supplied with handy swivel mounting bracket

BATTERY MADNESS

Below Half Price

A customer cancalled an order, and we are overstocked. Your gain, stock up while you can at these crazy prices. Batteries are Vinnic brand, Heavy Duty with no mercury.

2xC HEAVY DUTY NOW $1.20 PKT
WAS $2.70 SAVE $1.50 Cat SB-2342

4xAA HEAVY DUTY NOW $1.40 PKT
WAS $3.20 SAVE $1.80 Cat SB-2341

UV Eprom Eraser

See Cat. page 234 for full details. Cat. XE-4950

Save $10

Cat. Price $169.95

Now $159.95

Free Stand with every purchase in October

Cat. TS-1208 Value $4.95

LCD Handheld CRO Selout

New model coming. Save a fortune. Only 30 left. See Cat. for full details. Not available at Dealers or Wholesale. Cat. QC-1905

*May be display stock

CRAZY PRICE

Was $479 Only $350!!

MAILORDERS - FREECALL FOR PHONE ORDERS - 1800 022 888

OVERNIGHT DELIVERY

OVERNIGHT DELIVERY

250 Watt 240VAC to 115VAC Stepdown Transformer

Autotransformer type. See Cat. page 104 for full details.

Was $99.95 Cat. MF-1094
Save $20 **Oct. $79.95**

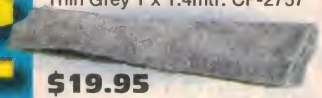
12V 2A Solar Battery Charger Regulator

See Cat. page 95 for full details. Cat. MP-3120

Was $79.95 Save $30 **Oct. $49.95**

Car Speaker Carpet

Thin Grey 1 x 1.4mtr. CF-2757



$19.95

Save $10 on Pro Rack Cases

See Cat. page 122 for full details.

		Was	Now	Save
1 unit	HB-5120	$69.95	$59.95	$10
2 unit	HB-5125	$89.95	$79.95	$10
3 unit	HB-5130	$99.95	$89.95	$10

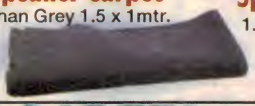
Audio Generator

Frequency range from 10Hz to 1Mhz in 5 ranges. See Cat. page 35 for full details. Cat. QT-2300

Was $269 Save $40
October $229

Black Speaker Carpet

Thicker than Grey 1.5 x 1mtr. CF-2755



$32.95

4 Way CCD Camera Switcher

See Cat. page 220.

Save $20
Was $189.50 Cat. QC-3480 **Oct. $169.50**

Adjustable Speaker Brackets!!!

Will hold up to 15Kg Speakers. See Cat. P55.

Was $29.95
Save $9.95
Cat. CW-2840
Oct. $20Pr.

BUY 10 LESS 10%

Speaker Grill Cloth $17.50

1.5 x 1mtr. CF-2752

Bargain Bags

We have just finished a new run of our famous Bargain bags. Each bag contains up to 2kg of electronic goodies -"Junk"" if you like! Cat. XB-9000 **$17.95**

Due to the enormous weight,p&p is normal rates, plus $5 extra for the bag and $8 extra for the box. Note: We do not guarantee that the pictured items will be in all bags.

Bargain Boxes

These are basically a bargain bag, plus even more goodies, bigger bulkier items. Cat. XB-9001 **$29.95**

Easy Start Car Jump Charger

The easy way to start a car with a flat battery in as little as 5 minutes. You don't even have to lift up the bonnet. Easy start is a lead with a cigarette lighter plug on each end and a black box in the lead.Cat. MB-3595

was $29.95 **Now $20**

AV-GAD EASYLOADER™ Home/Business Burglar Alarm Panels with Diallers

AV GAD Alarm Panels are sold all around the world. They are made in Israel - the same country that make many of the worlds top burglar alarms. These panels have a host of features, and suit commercial installers as well as the do it yourself installers. Installers/electricians please contact our Wholesale Dept for bulk prices, or our stores for trade prices with our trade card. A professional PIR, 2 different keypads, remote control and sound board are also available. See 99 Cat. page 82 for full details.

AV-GAD

5 Sector Deal

SAVE $135.50

NEW

Panel:	$249.00
Keypad:	$129.00
3 AV GAD PIRs:	$179.85
3 Wire power supply:	$22.95
7A Back up battery:	$39.95
2 x Reed/magnets:	$9.00
1 x Strobe:	$21.95
1 x AB siren cover:	$19.95
1 x Siren horn:	$19.95
1 x Internal siren:	$19.95
4 x Deterrent stickers:	$8.00
100mt. 6 core alarm cable:	$105.00
30mt. roll 2 core cable:	$9.95
Cat. LA-5484 TOTAL	$834.50

Pay Only $699

8 Sector Deal

SAVE $160.40

NEW

Panel:	$319.00
Keypad:	$129.00
5 AV GAD PIRs:	$299.75
3 Wire power supply:	$22.95
7A Back up battery:	$39.95
2 x Reed/magnets:	$9.00
1 x Strobe:	$21.95
1 x AB siren cover:	$19.95
1 x Siren horn:	$19.95
1 x Internal siren:	$19.95
4 x Deterrent stickers:	$8.00
200mt. 6 core alarm cable:	$210.00
30mt. roll 2 core cable:	$9.95
Cat. LA-5485 TOTAL	$1129.40

Pay Only $969

Passive Infrared Detector

THE CHOICE OF PROFESSIONALS This PIR is without doubt, the best we have sold. If you want a PIR that is pro quality, look no further. FEATURES •Temperature Compensation •White Light Protection: •High Immunity to RFI & EMI: •LED Selector: •Vertical & Horizontal Adjustment •Adjustable Pulse Count: •Choice of Lenses: Supplied with wide angle lens. Long range lens (30Mtrs) and Pet Alley lens available.

Long Range Lens 30M Cat. LA-5534 $4.95
Pet Alley Lens Cat. LA-5535 $4.95

BUY 5 $55 EACH

Cat. LA-5530 NEW **$59.95**

OVERNIGHT DELIVERY

BRAND NEW KWIK KITS

KwiK Kit

SEE LAST MONTHS ADS FOR FULL DETAILS

SPACE SIREN Cat KG-9026 **$19.95**

STEREO TONE CONTROL Cat KG-9018 **$34.95**

12 WATT MONO AMP Cat KG-9038 **$19.95**

STEREO LED VU METER Cat KG-9030 **$39.95**

11 LED INDICATOR METER Cat KG-9034 **$24.95**

INFRARED LIGHT BARRIER Cat KG-9096 **$38.95**

FIELD INTENSITY METER Cat KG-9084 **$8.95**

FOG HORN Cat KG-9092 **$9.95**

ANTENNA AMP Cat KG-9126 **$12.95**

100-200Mhz VHF CONVERTER Cat KG-9128 **$34.95**

CAR ANTENNA AMP Cat KG-9129 **$12.95**

VHF RECEIVER Cat KG9132 **$24.95**

BUILD YOUR OWN AM RADIO Cat KG-9136 **$19.95**

TEMPERATURE SWITCH Cat KG-9140 **$19.95**

ADJUSTABLE PRECISION TIMER Cat KG-9172 **$24.95**

INTERVAL SWITCH Cat KG-9176 **$29.95**

NEGATIVE ION GENERATOR Cat KG-9180 **$19.95**

OVERNIGHT DELIVERY

MAILORDERS - FREECALL FOR PHONE ORDERS - 1800 022 888

Cellular Phone/Video Camera/12V/240V/AAA/AA/NI-Cad/Ni-Mh Battery Discharger/Deep Conditioner/Fast - Slow Charger

Charger Includes:
- Power supply (240V to 12VDC 1A)
- Cigarette lighter lead.
- 6 x AA battery plate.

CHARGER Cat. MB-3550

Was $69.95 Save $10 **October $59.95**

Adaptors to Suit:
- Motorola Microtac: Cat MB-3577
- Motorola 8000/9000/9800 7.2V: Cat MB-3555
- NEC P3/P300 6.0V: Cat MB-3556
- NEC P388/P4/P6/P400/P600/P601: Cat MB-3574
- Ericsson 237/337 6.0V: Cat MB-3557
- Ericsson 197/198/172/818: Cat MB-3576
- Nokia 2110 6.0V: Cat MB-3559 • Nokia 101/121: Cat MB-3560
- Ericcson 788 / 768: Cat. MB-3558 • Nokia 8110: Cat MB-3562

Video Camera Battery Adaptors: • Sharp, Hitachi, Sony: Cat MB-3565
• Panasonic, Canon, JVC: Cat MB-3566

AA/AAA Battery Adaptors: • AA x 6: Cat MB-3570 • AAA x 6: Cat MB-3572

Isobarik Active Subwoofer Kit

NEW

Refer Electronics Australia Sept. 99.
This new Isobarik subwoofer kit uses 2 x 12" polycone woofers and a 65w RMS prebuild amplifier module. The cabinet is supplied partly assembled, and in a raw state which can, when finished be painted, carpeted, or left raw if its hidden away behind the sofa.

Quote from Electronics Australia.
"Overall then, we'd have to say that from what we've heard of commercial subwoofers costing two or three times the price of the Jaycar Isobarik, it represents very good value indeed. If you're prepared to tackle this type of kit loudspeaker, where you only need to bolt components in place and finish the box to your personal taste, then this must be one of the most cost-effective ways to own your high-performance powered subwoofer"

SUBWOOFERS (2 X CW-2130)	$193.90
65W AMPLIFIER MODULE (AA-0502)	$192.00
CABINET KIT (CS-2536)	$219.00
Buy all Together for	**$604.90**

Only $569

Save $35.90

For 150W module add $126

PIR CCD Surveillance Camera

Were $12.95ea **October $6.95ea**

Crazy price.
Includes PIR.
Limited quantity.
See Cat. page 219.

Cat. Price $199
Now $139
Save $60 Cat. QC-3478

DURATECH Soldering Station

See 99 Cat. page 128 for details.
Cat. TS-1380

$189

Buy in October Receive **FREE**

$31.30 worth

200g Roll Solder	NS-3005	$6.50
3 Rolls Desolderwick	NS-3020	$9.85
Desolderpump	TH-1862	$14.95

FREECALL FOR PHONE ORDERS 1800 022 888

SERVISOL AEROSOL CANS NEW

A	B	C	D	E	F	G	H	I	J
NA-1000	NA-1004	NA-1012	NA-1020	NA-1027	NA-1002	NA-1008	NA-1018	NA-1025	NA-1504
$13.95	$8.75	$9.95	$5.95	$8.95	$8.95	$8.75	$14.95	$2.95	$12.95

Mains Connector Bargains

Description	Cat.	Was	Now	Save
Single Power Point	PS-4040	$9.95	$6.95	$3
Protecta Double Power Point	PS-4058	$19.95	$13.95	$6
Single Modular Power Point	PS-4042	$10.95	$7.95	$3
Single Architrave Switch	PS-4050	$5.50	$4.50	$1
Single Wall Switch	PS-4055	$5.95	$4.95	$1
Double Architrave Switch	PS-4052	$8.50	$6.50	$2
Double Wall Switch	PS-4057	$8.95	$6.95	$2
Behind Plaster Bracket	PS-4078	$2.50	$1.50	$1
Large Junction Box	PS-4065	$4.75	$3.75	$1

PS-4042 PS-4055 PS-4050 PS-4052

PS-4040 PS-4058 PS-4078 PS-4065 PS-4057

5W Solar Car Battery Booster

Ideal for permanent installations on boats, caravans, cars etc.
See Cat. P96 for full details.

Was $119.50 Cat. ZM-9052
Oct. $99.50 Save $20

MEGA BULK SCREW PACKS NEW

We dare you to find a cheaper source of #4 self tapping screws.

Description	Pack Size	Cat No	Price
3/8" (9mm) x No.4 Phillips pointed thread zinc plated	25	HP0560	$1.50
	200	HP0562	$4.00
	1000	HP0563	$15.00
3/8" (9mm) x No 4 Phillips slotted blind end zinc plated	25	HP0565	$1.50
	200	HP0566	$4.00
	1000	HP0567	$15.00
3/8" (9mm) x No4 Posidriv pointed thread black Japanned	25	HP0570	$1.80
	200	HP0571	$5.00
	1000	HP0572	$18.00
3/4" (19mm) x No 4 Phillips pointed thread Cad plated	25	HP0574	$1.00
	200	HP0575	$3.00
	1000	HP0576	$12.00

EMAIL ORDERS: techstore@jaycar.com.au **WHOLESALE EMAIL: wholesale@jaycar.com.au**

Jaycar ELECTRONICS

HEAD OFFICE
8-10 LEEDS ST RHODES 2138
PHONE: (02) 9743 5222
FAX: (02) 9743 2066

Quality Endorsed Company ISO9002 Lic 6143 Standards Australia

WHOLESALE
PHONE: (02) 9743 5222
ORDERS: 1800 620 169
FAX: (02) 9743 3070
FREEFAX: 1800 810 137
MELB: 1800 731 363

MAIL ORDERS FREE POST TO:
Reply Paid 72. Jaycar Mail Orders. PO Box 185 Concord NSW 2137 FREE CALL FOR ORDERS: 1800 022 888
ENQUIRY HOTLINE: (02) 9743 6144 FAX: (02) 9743 2066

ROAD FREIGHT ANYWHERE IN AUST (up to 20kg) $14.00
POST & PACKING $10 to $24.99=$4.00 $25 to $49.99=$5 $50 to $99.99=$7 OVER $100=$8

bankcard MasterCard VISA Diners Club International AMERICAN EXPRESS eftpos

VISIT OUR WEBSITE www.jaycar.com.au

ADELAIDE SA	• 191-195 Wright St (Cnr. St. Lukes Pl.) • Ph:(08) 8231 7355 • Fax: (08) 8231 7314 • Mon/Thur:8.30-5.30 • Fri:8.30-8.30 • Sat:8.30-4
BURANDA QLD	• 144 Logan Rd • Ph:(07) 3393 0777 • Fax:(07) 3393 0045 • Mon/Fri:9-5.30 • Thurs:9-8.30 • Sat:9-4
ASPLEY QLD	• 1322 Gympie Rd, cnr Albany Creek Rd • Ph:(07) 3863 0099 • Fax (07) 3863 0182 • Mon/Fri:9-5.30 • Thurs:9-8.30 • Sat:9-4
CANBERRA ACT	• 121 Wollongong Street. Fyshwick • Ph:(02) 6239 1801 • Fax:(02) 6239 1821 • Mon/Fri:9-5.30 • Sat:9-4
MELBOURNE CITY	• Shop 2,45 A'Beckett St • Ph:(03) 9663 2030 • Fax:9663 1198 • Mon/Fri:8.30-5.30 • Fri:8.30-8.30 • Sat:9-4 • Sun:10-4
COBURG VIC	• 266 Sydney Rd • Ph:(03) 9384 1811 • Fax:(03) 9384 0061 • Mon/Fri:9-5.30pm • Fri:9-8.30 • Sat:9-4
SPRINGVALE VIC	• 887-889 Springvale Rd Mulgrave. Nr Cnr. Dandenong Rd • Ph:(03) 9547 1022 • Fax:(03) 9547 1046 • Mon/Fri:8.30-5.30 • Fri 8.30-8.30 • Sat:9-4 • Sun:10-4
HOBART TAS	• 140 Campbell St. Hobart • Ph: (03) 6231 5877 • Fax:(03) 6231 5876 • Mon/Thur:9-5.30 • Fri:9-7 • Sat:9-4
SYDNEY CITY	• 129 York St • Ph:(02) 9267 1614 • Fax:(02) 9267 1951 • Mon/Fri:8.30-6 • Thurs:8.30-8.30 • Sat:9-4 • Sun:10-4
BANKSTOWN	• 363 Hume Hwy Cnr Meredith • Ph:(02) 9709 2822 • Fax:(02)9709 2007 • Mon/Fri:9-5.30 • Thurs:9-8.30 • Sat:9-4 • Sun:10-4
GORE HILL	• 188 Pacific Hwy Cnr. Bellevue Ave • Ph:(02) 9439 4799 • Fax: (02)9439 4895 • Mon/Fri:9-5.30 • Thurs:8.30 • Sat:9-4 • Sun:10-4
PARRAMATTA	• 355 Church St (Cnr. Victoria Rd) • Ph:(02) 9683 3377 • Fax:(02) 9683 3628 • Mon/Fri:9-5.30 • Thurs:9-8.30 • Sat:9-4 • Sun:10-4
PENRITH	• 199 High St • Ph:(02) 4721 8337 • Fax:(02) 4721 8935 • Mon/Fri:9-5.30 • Thurs:9-8.30 • Sat:9-4 • Sun:10-4
RHODES	• 8-10 Leeds St • Ph:(02) 9743 5222 • Fax:(02) 9743 2066 • Mon/Fri:9-5.30
NEWCASTLE	• 990 Hunter St. (Opp. Selma Street) • Ph:(02) 4965 3799 • Fax:(02) 4965 3796 • Mon/Fri:9-5.30 • Sat:9-4
PERTH	• 326 Newcastle St Northbridge • Ph:(08) 9328 8252 • Fax:(08) 9328 8982 • Mon/Fri:9-5.30 • Thurs:9-7.00 • Sat:9-4
NZ	• 14A Gillies Ave. New Market. Auckland. • Ph: (09) 529 9916 • Mon - Fri: 9-5.30 Sat: 9-5.30

*OVERNIGHT DELIVERY AVAILABLE ON REQUEST
Subject to conditions: • Max weight 3KG (inc cubic) $10
• No dangerous goods • Max weight 5kg (inc cubic) $16
• Stock & availablity • Orders must be received before Midday E.S.T.

NEW JAYCAR STORE IN MELBOURNE 141A MAROONDAH HWY. RINGWOOD. VIC. 3134. PHONE: 03 9870 9053 FAX: 03 9870 2598

MAILORDERS - FREECALL FOR PHONE ORDERS - 1800 022 888

OPEN Fist

BY STEWART FIST

Brain Cancer

The association of cellphones with brain cancer seems to capture the public's imagination. While the research scientists see this as important, it is by no means the main thrust of the world's research today.

It is understandable, if not logical, to think of brain cancer and Altzheimers as being the most likely specific diseases to be linked to high use of a mobile phone because we still think of the body in terms of the simplistic anatomy we probably learned at school — and that the brain is a big and well known organ right next to our ear.

In fact, cancer begins with only one cell going crazy and dividing without inhibition, so the size of the organ plays very little part. Cancerous cells are those where individual or small numbers of genes are misbehaving.

Some of our genes promote their cells to divide, and cancer cells divide and multiply very rapidly. They don't respect the geographic presence of neighbouring cells which would normally inhibit their growth, and invade the space around them then break off and distribute colonies of proliferating cells through the body.

There are also genes which inhibit their own cell division, and block it from multiplying, and cells 'whisper' between themselves using ionic flows and enzymes to coordinate these functions. If these inhibiting genes misbehave and fail to do their job, the problems are much the same.

Then there are gene proteins which act as guardians or judges over their neighbours. When misbehaving cells are detected nearby, they take concerted action and instruct the aberrant cell to suicide (apoptosis). If this fails, there are other functionaries, much like bovver-boy cells, who hunt down the rampant cell and kick it to death.

The body has multiple back-up systems for survival, because for millions of years we've had to evolve in dangerous environments. All of these layers of control and protection have similar results, but they are different functions all coordinated by messengers of ionic flows within and between the cells.

But we've probably managed to make our environment pretty dangerous in only a few hundred years — especially in ways that might influence the messengers.

The other possible agents or causes are nuclear radiation (power plants and fallout from two thousand nuclear bomb tests), various environmental polluting chemicals, some medicals and food additives, mercury from dental amalgam (dental staff and professionals have twice the risk of brain tumours) and some people think, aspartame the artificial sweetener.

Brain cancer therefore usually follows exposure to ten thousand other possible, but less obvious, causes of cancer than just cellphone use, and we know that most cells need to accumulate many 'causes' over 10 to 30 years before they become dangerous.

Back in the 1960s, before cellphones, Australia had a brain cancer (age-adjusted) rate in the region of 3 to 4 people per 100,000 which was lower than the USA and Europe. However in 1998, Dr Andrew Davidson, a cancer specialist in Western Australia, published the claim that the 1982 incidence of brain tumour in that state was 6.4 cases out of 100,000 in males and 4 in females. He said it then rose to 9.6 for males and 6.5 for females a decade later. So cellphones could be making a (un)healthy contribution to the recent increases.

It's now commonly said that cellphone type radiations may 'promote', rather than 'cause', brain cancer — but that phrase is almost meaningless when cell-gene damage is 'multi-causal'. Which is the cause, and which is the promoter?

Even more disturbing is the fact that the rate-increase appears to be in young people as well as the aged. Some health administrators believe that the higher rates are just due to better detection — but this claim is hard to sustain with a condition so debilitating and dramatic as brain cancer in its later stages. Not too many would be missed over time.

The rather casual use of words like 'tumour' (which just means abnormal growth) and other vaguely-defining medical terms, often make statistical comparisons and rate-increase calculations difficult to check.

You've got to distinguish between:

- 'brain' and 'nervous system' cancers (which include spinal chord, eye, and brain);
- 'benign' and 'malignant' (localised tumours and distributed cancers); and
- 'primary' and 'secondary' (those that begin in the brain, and those that are secondary to other cancers).

This last distinction confuses the statistics, because it is sometimes hard for doctors to tell which cancer was primary.

In the USA the primary brain tumour incidence rose from 4.5 in every 100,000 to 4.9 cases between 1975 and 1977. Then, after staying roughly the same for eight years, it increased in 1985 to 5.3 cases. Since then it has hovered in the 5.2 and 5.5 range. Similar changes, ranges, and increases have been seen in England, France, Germany, and Italy.

Brain tissues grow slowly, and so brain cancer in adults takes, on average, 10 to 15 years for the obvious symptoms to appear. And we live longer these days; so older people will naturally have more such cancers than they did in the 1970s and '80s.

In the Australian population of 18 million, we have 600-800 primary brain tumours each year (one newspaper report says 1200 — but that's probably overall nervous system cancers); and about one third of adults use a mobile phone, on average. We'd therefore expect roughly 400-500 cases which are totally unrelated to any cellphone use.

However a few hundred people with brain cancer will also be cellphone users, and they will naturally suspect this is the cause. Ten

percent of these will be people who used their cellphones, say, 4 hours or more a day. And they will be absolutely convinced that cellphones are the cause; that's a natural deduction for sick people to make — even though it is probably incorrect.

Many will then begin to research their illness, and if they look closely, there's plenty of evidence that the cellphone industry has consistently distorted the medical facts, and coloured the public presentation of adverse evidence. This is where some of the public fury comes from; no one seriously reading the scientific literature can doubt the extraordinary range of systematic lies and deceit.

But who can tell whether any individual's brain cancer has a causal connection to a cell phone or not? And the statistical evidence for the population as a whole is just as confused. Even if the rate is on the rise, such problems are becoming more apparent in geographic regions poisoned by toxic chemicals, pesticides, etc.

Today we are probably being subject to a much wider range of chemicals than we were in the 1970s. Our overall exposure to known toxic substances is probably reduced, but the range of exotic chemicals in the environment is rapidly increasing. There's said to be 10,000 new chemicals each year, so daily we are coming into contact with stray new molecules that biomedical science hasn't even begun to research.

There's no simple solution. Cancers aren't like the old traditional diseases of the post-War years where scientists identified one organism which produced one set of symptoms, and eventually cured it (in most cases) by a single drug.

Cancer is a disease of the genes, and cancer mutations of the genes accumulate slowly over half your lifetime. Some cancers can have a single hereditary genetic-mutation cause, but these are rare. A very few can develop after a single exposure to toxic substances or ionising radiation.

But generally, our cancers are multi-causal in origin. Cancer of the large intestine, for instance, requires specific mutations to take place on five different genes in the cells of the intestine wall. They've now identified seven genes which are essential here, but when any five of these are damaged, you'll get colon cancer.

Many of us will go through life with only two, three or four damaged genes in our colon cells, avoiding cancer more by good luck than good management. It's what triggers that fifth 'back-breaking straw' mutation that is the problem.

It's now commonly said that cellphone type radiations may 'promote', rather than 'cause', brain cancer — but that phrase is almost meaningless when cell-gene damage is 'multi-causal'. Which is the cause, and which is the promoter?

If the evidence of the 'promotion' effect of RF is correct, then our society will always have a large number of people where the possibility of cellphones triggering cancers over a lifetime, can't simply be written off.

There's probably also a hereditary component in brain cancer — and this is best considered as one of the potential multi-causal agents. The question is then whether our exposure standards should be set on the basis of 'average' susceptibility in the community, or whether we must take into account the genetically susceptible.

It's also likely that any brain cancer victim will have a history of chemical exposure; researchers will always find something, if they look hard enough. Almost everyone has a history of serious chemical exposure at some time in the past, if you think back.

For instance, I worked for many years in film production, and we used cancer-causing benzene as a cleaning chemical after editing our films. Do we take these transient, or occupational exposures into consideration when setting standards? Commonsense says yes — but if we do, how do we define or apply such standards? ❖

MOFFAT'S MADHOUSE

Perfect Paul, MEET PERFECT PIERRE!

With the imminent arrival of the Millennium, there's been lots of talk about whether there will be machines in the next century that are alive. It's a fascinating debate, aired regularly on talkback radio and TV and in magazine articles. Some very respected scientists are saying that computers will eventually become fast enough, and have access to enough memory, so they can totally replicate the functions of the human brain. When that stage is reached — since the brain is alive, then the computer must also be alive.

After considerable thought on the subject, my feeling is that, no matter how advanced and complex a machine is, it can't be 'alive' unless it has a soul. Conversely, anything that is 'alive' must have a soul, and this extends to things like dogs and cats and slugs and snails, and even plants perhaps? Here we sow some seeds for a fine argument, extending well beyond the bounds of religious dogma.

Machine life is indeed the stuff of science fiction. Does Australia get a TV program called Outer Limits? In one episode, scientists developed a robot which it was hoped would serve as a companion for men stationed in remote places like Antarctica. It (she) was a very nice looking young lady indeed, and it was decided to test a prototype by having it (her) take up residence with one of the scientists.

He knew the lady was only a bag of cogs and gears and integrated circuits, but she thought otherwise. As they got to know each other better, the robot snuggled up to the scientist and whispered in his ear, "you must realise I am FULLY functional." Er... yeah. Anyhow, he resisted, preferring human company for such matters. And the robot became insanely jealous. Soul? Who knows...?

One thing is certain - any machine claiming to be alive must be able to speak as though it's alive, and there's been some pretty powerful research going in that direction lately. You may remember in the March Madhouse column we discussed Perfect Paul, a computerized voice that was supposed to replace humans who prepare recorded weather forecasts for broadcast on the American weather-radio system. The network is also used to issue emergency warnings about storms and other natural disasters, in which case it can break in on a commercial radio station and take control of its broadcast.

Station managers were most unhappy about this, saying there was no way Perfect Paul would be allowed to speak on their stations because nobody could understand him. It is true, Perfect Paul's synthesized voice takes some getting used to, to put it politely. Especially when confronted with place names.

Several months on, humans still speak on weather radio, although there are occasional announcements saying the system will soon switch over to fully-automated operation with an electronic voice. So far nothing has been heard of it, at least in our neck of the woods near Seattle. But over the border in Canada there was a big surprise.

My home is 64km line-of-sight from Victoria, our nearest Canadian neighbour. They have a weather radio system over there too; it's one of three such stations I can hear on my trusty scanner. Victoria is also the nearest major city to Port Townsend, closer than Seattle, so their weather forecast is most likely to apply to us. Since there is a big hill in the way, the Victoria weather radio signal is often scratchy, but useable.

One day I was listening to Victoria and noted there was a new guy reading the weather I'd never heard before. And he was good, too... no fluffs or stumbles, a very professional delivery. To put it kindly, most voices on weather radio belong to meteorologists, not announcers. So this new fellow was something special, almost too good to be true.

That was indeed the case. Our new weather presenter was just a robot, whom we shall call Perfect Pierre. His voice was the result of a research project done by a company called Speech Technologies Research Ltd, which just happens to be based in Victoria. They'd got Perfect Pierre up to the smoke-test stage, and he was busy holding forth on Victoria's weather radio station. Perfect Pierre was obviously still experimental; every now and then a human voice would break in and speak some place name Pierre had not yet learned to cope with.

The Canadian speech system is called "AVIPaDS" for Automated Voice Integration, Production and Dissemination System. It uses the concatenation method whereby words of human speech are recorded and then strung together to produce the desired phrases. By contrast, the American Perfect Paul uses a 'phoneme' system in which synthesized sounds are joined together to produce speech.

A concatenation system is usually limited to a few hundred complete recorded words that sound very good, having originally been spoken by humans. However the sound is a little jerky since each word doesn't flow into the next in the normal way. The phoneme system, being a synthesizer, can say anything. But none of it is very good quality.

The Canadians seem to have solved the inflexibility of the concatenation system with a combination of finesse and brute force. Each word or phrase in their system is spoken by one person, but then each recording is "adjusted" digitally to ensure tone, pitch, speed and timbre of all phrases is the same. That way the speech sounds like it's all spoken as a complete unit rather than in jerky bursts.

Concatenated speech takes up a lot of room; after all it's just like a collection of .WAV files, and they aren't small as you'll soon see. There is still the problem of properly pronouncing all those pesky place names, and each one must be recorded and stored separately. So we're talking big hard disk space here, with the added problem of accessing everything at the speed of human speech. The Canadian solution is straightforward: use an enormous speech database on fast computers with whopper hard disks.

If you'd like to hear how good this really sounds, I've provided a recording of Perfect Pierre in action, recorded via my scanner from the Victoria weather radio station. You can download it from the EA web site; the filename is PIERRE.ZIP. Even though I've

recorded it fairly lo-fi, the file still runs just under 600k for about 15 seconds of speech. So be patient!

Multi-lingual

Back in the USA, all is not lost, and there's some very advanced work being done by companies such as the big communications innovator Bell Labs, now known as Lucent Technologies. They are working on a system that will directly convert written text into good-quality speech. But the real trick is to make it work in several languages: so far, English, French, Spanish, Italian, German, Russian, Romanian, Chinese, Japanese, and Navajo Indian.

The basic underlying software is the same for all the languages except for English. But each language requires some additional modules containing sounds unique to each language and special linguistic rules pertaining to them. This information is stored in external files that the main synthesizer engine accesses as it runs.

Bell Labs suggest their system might be useful for reading e-mail messages, presumably in any language. Wouldn't it be great if you could type in English in one country and make the speech come out as Chinese or whatever at the other end? There's been no mention of such a thing, but you can bet somebody must be thinking about it.

How about the Bell Labs system for the next Perfect Paul, reading forecasts on weather radio? It's easy enough to test it. Bell Labs have thoughtfully allowed Internet users to play around with their new speech system. Just go to the web address **http://www.bell-labs.com/project/tts**. You can select which language you'd like to work in, and the kind of person speaking (man, woman, child, big man, and even a goofy voice called 'ridiculous'). Then you can type in a phrase, and in a few moments your computer speaks it for you.

As mentioned earlier, the weak link in weather announcing is place names, so I decided to give the Bell Labs system a test with this piece of text, exactly as it was typed into the Ball Labs web site: "There are lots of pretty girls, in Seattle, Tacoma, Spokane, Vancouver, Portland, and Victoria.

Most voices on weather radio belong to meteorologists, not announcers. So this new fellow was something special, almost too good to be true..

Also in Gig Harbor, Port Townsend, Skwem, and Port Angeles... Perfect Pall should visit some of these places."

It took some fiddling to get this right. Note the comma after 'girls'. Without the comma, 'girls' and 'in' are spoken as one word: girlsin. The town 'Skwem' is actually spelled 'Sequim' but it's pronounced 'Skwim'. But the synthesizer pronounced 'Skwim' as 'Skweem' so 'Skwem' was needed to produce 'Skwim'. Got it? Me neither. Also notice the misspelling 'Pall' instead of 'Paul' for similar reasons.

The speech synthesizer did a fine job with these names, after that little bit of adjustment. If you'd like to hear for yourself, you can download that test message from the EA web site, PLACES.ZIP (225k).

One suspects that some of those places were already stored in a software table somewhere. But there are others less successful: A main highway between Seattle and the eastern USA goes over Snoqualmie Pass. It snows a lot up there in winter, and weather reports are essential. But the poor old Bell Labs voice produced a Snoqualmie that sounded like it was choking or throwing up or both.

Another application Bell Labs is looking at is talking computer help systems. Not only will you hear the speech, you'll see it - there is a talking face under development which will be linked to the speech synthesizer so closely that lip-sync will be possible, allowing deaf people to interpret the spoken messages by lip-reading.

Anybody ever watch the TV series 'Red Dwarf'? This Bell Labs system seems very similar to Holly, the talking computer. Not only does Holly talk, she has 'attitude', and your computer can have attitude too in its own help system. Or better yet, someone else's computer can have attitude, and they won't even know it until the moment is ripe.

Your computer normally alerts you to significant happenings or errors with various bing and bong sounds or musical chords. These are only .WAV files, and you can replace them with .WAV files of your own, courtesy of Bell Labs. These will be computer-sounding voices; very appropriate since it's a computer doing the talking.

If you don't want to prepare your own spoken error messages on the Bell Labs web site, I've supplied a couple you can download from EA as .WAV files. One says, "ERROR! ERROR! YOU ARE A COMPLETE IDIOT!" (I said it had attitude...) And the other speaks that famous line from Robbie the Robot on the old Lost In Space TV series: "THAT DOES NOT COMPUTE!"

IDIOT.WAV (zipped up for faster downloading as IDIOT.ZIP, 47k) is spoken in matter-of-fact tones, as if you ARE a complete idiot. COMPUTE.WAV (COMPUTE.ZIP, 28k) is a little more emotional. It sounds like the frustrated computer is stamping its foot with each word: THAT! DOES! NOT! COMPUTE!!!

What do I do with these, you say? Copy them into your WINDOWS\MEDIA directory where all the other .WAV files live. Then go into Control Panel, select Sounds, and then select the event you want to specify the sound for. 'Critical Stop' is a good place to use IDIOT.WAV. It occurs at times at which the IDIOT message is very appropriate. As for the COMPUTE message, hook that up to the Windows 'Exclamation' event.

Of course the real fun comes when you do this to someone else's computer. Put both .WAV files on a floppy and carry them around with you until an opportunity presents itself (such as the computer user out to lunch). Then do the above modification. They'll soon catch on that the person laughing the hardest is the perpetrator!❖

Forum

Conducted by Jim Rowe

CRO? Who needs a CRO, — even for TV servicing?

May's discussion of the equipment needed for effective electronics servicing has prompted responses from a couple more 'real world' service technicians. Our new respondents basically agree that despite whatever students may be led to believe in TAFE courses, a lot of servicing can be achieved with very little test gear. One suggests that even a CRO is something of a luxury, and certainly not essential...

IN THE JULY column, you'll perhaps recall, I ran a letter from service technician Mr Andrew Blight, of Glen Waverley in Victoria, responding to the letter we'd published in the May issue from young reader Mr R. Fox. Mr Fox had done a couple of TAFE courses and had then been trying to break into servicing without much success. In fact he seemed to be caught in a classic 'no work, therefore no experience; but no experience, therefore not attractive as a potential employee' conundrum. He also didn't have the financial resources to buy the test instruments he believed were needed for tackling basic servicing jobs at home, to get some experience that way.

Mr Blight made some very sensible suggestions regarding both aspects of Mr Fox's dilemma, although he was ultimately rather unencouraging in terms of what he saw as the future prospects for service technicians — or perhaps more accurately, the lack of them...

Another writer we quoted was Mr Paul Hetrezelis of Noble Park in Victoria, also an experienced service technician, who offered some helpful and practical suggestions as well.

Not surprisingly, after reading the comments in the July column, another couple of service technicians were prompted to write in offering their own advice. They make interesting reading too, and as I know this is a subject close to the hearts of many of *EA*'s readers, I thought we'd start this month's ball rolling with them.

The first came as an e-mail from Mr Brad Sheargold of Collaroy in NSW, who also wrote recently about DVDs and region coding. Here's what he had to say this time, about servicing and test equipment:

I am writing after reading your Forum in the July 99 issue of EA, entitled 'What test gear DO you need for electronics servicing?'

Having spent a long time in the service industry, although it's not my primary source of employment now, I would like to pass on a few comments to you and Mr Fox.

The test equipment required depends on what you have to service. Some products can be 'fault found' with a wet finger and a speaker; some do need test equipment. But most of all, the basic knowledge of how things work is extremely important, as stated by Mr Hetrelezis.

I decided to specialise in audio equipment very early in the piece and found that the two essential pieces of equipment, apart from a multimeter, were a variac and a CRO.

These were the first two pieces of gear I purchased, both made in mainland China. The CRO had a 2" screen and used 6N1 valves, which I knew were dual triodes but did not know, until the article about Vintage Radio in July 99 'Silicon Chip', were the same as a 6BQ7A. I replaced them with 12AU7s some years ago. This CRO still goes and as it is so small, sometimes I still use it in the field instead of my larger Hitachi.

The variac is still in daily service in my workshop.

Why a variac and a CRO? A variac enables you to 'wind up' the equipment after having replaced parts, and monitor the current. If there is a fault which you didn't find, you can switch off without blasting the expensive pair (or pairs) of new output transistors half way into the middle of next week.

I was employed by a major firm as a senior tech in their service department some years ago, and was horrified to see the method used to fire up high power amplifiers. This was to stand back and turn them on with a broom handle! Needless to say this practice ceased immediately.

TVs with switchmode power supply regulators that have 'lost the plot' can also be serviced using a variac.

A CRO enables you to set output stage quiescent current by looking at the output waveform. Setting Iq properly is not possible without a CRO (or a distortion analyser).

I use a method which many techs I have spoken to haven't seen before. This is: feed a 30 to 40kHz sinewave into the amp and set the level to produce full vertical screen deflection with the CRO attenuator set at 0.5V per division — i.e., an output of about 4V p-p WITH an 8-ohm load connected. Then adjust the bias for no crossover distortion, which, at this frequency tends to move up the wave. This method gives much better results when compared to the usual 1kHz method.

Getting into the service industry is hard, although with Mr Fox's determination he probably will succeed. My advice to him is find himself a mentor — a person who will teach him the basic building blocks of electronic gear. Mine was the owner of the firm who used to manufacture 'Vadis' brand musical instrument amplifiers. The gentleman concerned was very knowledgeable, especially in the audio field. He taught me about 'bottles' as well.

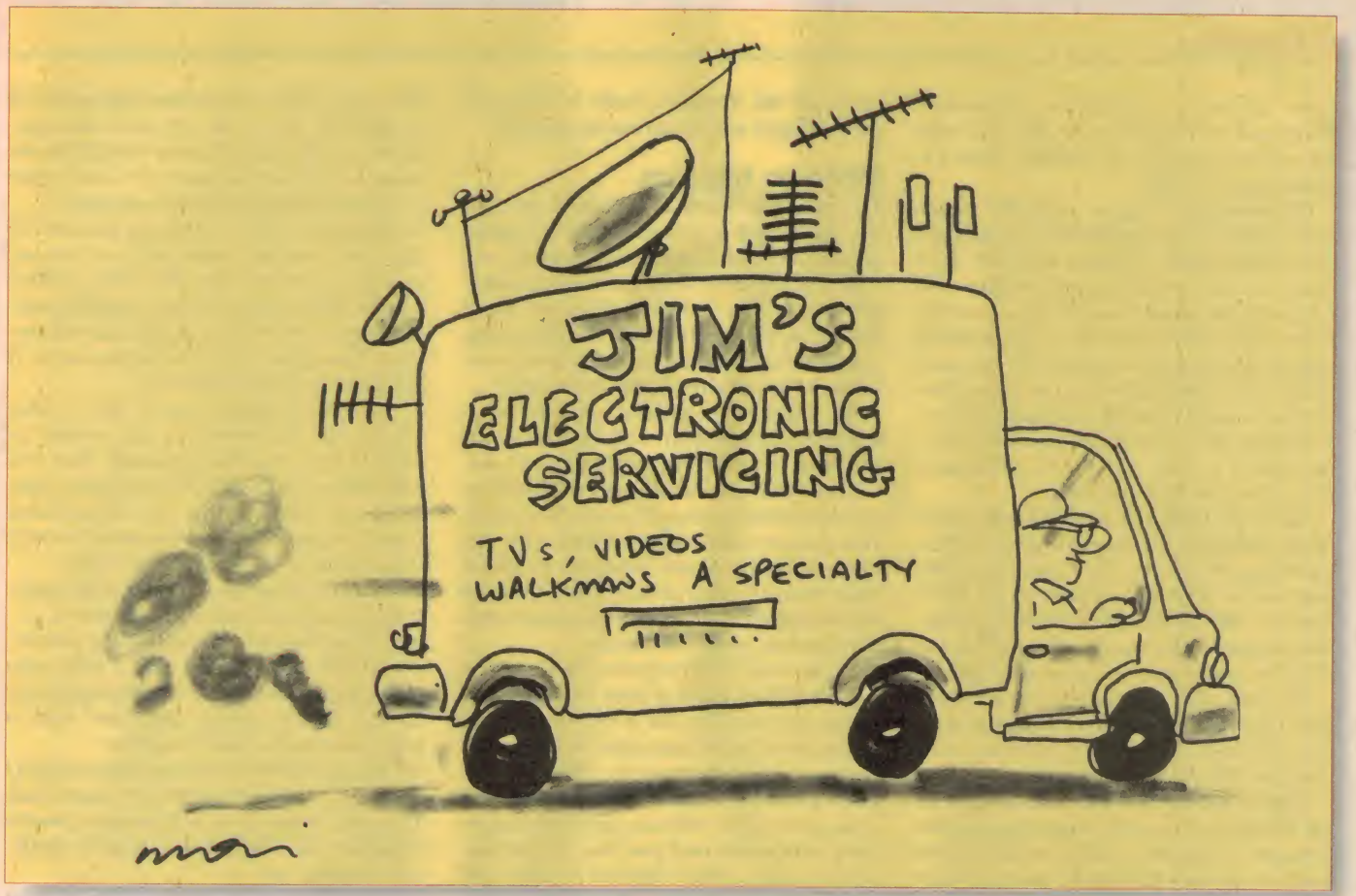
Once Mr Fox understands how things work he will be able to service almost anything. I will never forget being told by my service manager that "I was an audio tech, and couldn't service television sets". My cheeky reply was "Bill (not his real name) how hard can a TV set be? It's only a radio receiver with a picture tube attached!"

'Cleanup specials'

At the time he was probably right, but over the years you come to understand that once you master the HV power supplies it is 'only a radio receiver with a picture tube attached'! Most of the TV receivers in my house are council cleanup 'specials' which I have repaired using the basic theory learned over the years — and the EA ESR meter. What a great piece of gear that little gadget is!

I was one of the very few people in the department who could service valve equipment as well. Mr Hetrelezis is right, most gear can be serviced without manuals etc. if you know what you are doing.

You can align things 'by ear'. I have tuned the replacement transmitter board in my 'brick' mobile phone with no test instruments whatsoever — using only a very small anten-



na and that nice lady who tells you that "the network feature that you accessed is now deactivated".

Some years ago I was given the PA equipment, manufactured by Auditec, used as the fire alarm in the Sharp Service Center for repair. When it was returned by an associate of mine he was asked could they have the service manual. When told by him that it had been serviced without a manual, there was a look of disbelief. He told them that we were of the old school and repaired most gear without the manual!

Things are not getting any easier in the electronics game, however the basics do not change. I recently had a music centre in for repair which had no output. It used one of those nasty STK hybrid output chips and I quickly found, using my CRO, that I had signal on one side of the speaker relay but not the other. The relay protection circuitry had failed. I went looking for the drivers for the relay, only to find they were INSIDE the STK. Probably there was a sensor to prevent thermal runaway inside the chip and this had failed.

Not wanting to junk what was a working amplifier and replace the expensive STK, I decided to build a simple discrete three-transistor DC sensor to drive the relay. After all, the main purpose of the relay is to open when there is an horrendous amount of DC at the output, to prevent the speakers being fried. If the STK goes up then the main fuse will blow. My customer, once all was explained, was delighted and fully understood what I had done. In jest, friends of mine now reckon that my next project will be a Pentium III made of BC109s!

It's not getting any easier; chips get more legs every day, but you CAN do it if you try. All you need is someone who can show you how things work and take the time to teach; determination and a love of 'the game' will do the rest.

Thanks for those comments, Brad. I like your positive and constructive approach, and I imagine Mr Fox will find comfort in them as well. Hopefully he'll be cheered especially by your experience that with a CRO and a variac, you can service quite a lot of audio and TV equipment.

All the same, my hat's off to you for cheerfully tackling so many servicing jobs without a manual. I've serviced most of my own equipment over the years, but I do like to have the manual (or at least a schematic) handy — with some of the modern test gear in particular. Without even a schematic, I seem to make very slow and frustrating progress, especially with intermittent problems (which I always seem to get). But then, so far at least I've only been an electronics GP who's needed to do servicing occasionally when the need arises, not a service tech having to do it all the time!

Who needs a CRO?

Moving on, the other technician who was prompted to write in (again via e-mail) was Mr Doug Thwaites of Esk in Queensland, who has contributed to various sections of the magazine over the years — including Serviceman, if I recall. Mr Thwaites represents an earlier generation of servicing techs again, and I think you'll find his comments quite interesting because of that:

It was with pleasure that I read Mr Blight's letter in this month's Forum. I am 82 and still servicing, for two reasons: I am the only tech in this rural era, and I love it.

I started servicing radios when I was 16, using a book called 'Practical Radio' by Newnes in those prewar days. I became what was known as a 'troubleshooter' — worked in a Radio Rentals workshop in London where you found the fault, wrote the work to be done on a large label, and passed to the tech who did the work!

I even worked on TVs prewar. Very long electrostatic CRTs were used to receive the limited transmission from Crystal Palace.

During the war years I taught troubleshooting to radar mechanics. The first radar units were converted Pye TVs. After the war I went into business for myself in Kings Road, Chelsea, and was an HMV TV agent.

I was brought out to Melbourne in 1956 by Myers to start their service department. Later went to RMIT, to teach everything

from Radar to Broadcast Operators Certificate of Proficiency. I left and went into my own business in Adelaide when TV started there in 1960.

Unfortunately I agree with Mr Blight about TAFE. I have taught there in Adelaide and in Bundaberg. Working with B/W TV I never needed an oscilloscope because you have a display already on the set — so use it. In the valve days I used the 6V AC filament voltage fed through a capacitor to the grids of the valve chain from video to tuner. That switched them on and off and produced lovely bars on the screen if that part was working. Now it is solid state I use a sine/square wave generator to do the same.

One of the faults was a shorted video diode which would give you a negative picture. While working part time for TAFE I once put this fault on in the workshop part of the TAFE course — and got into trouble from the permanent instructor who had never met it and was unable to answer questions from the pupils.

The only answer for Mr Fox is to try and find a genuine technician and get him to let him work there, just for the experience — the one thing TAFE does not teach.

Thanks indeed for those comments too, Mr Thwaites. It's really interesting even for someone of my own vintage to hear of the kind of servicing techniques used by *really* experienced older service tech's like yourself, so I hope Mr Fox will find them encouraging as well. I must confess I wouldn't have attempted to 'signal trace' a video IF line using raw 6V AC from the heater circuit, for example, but I can see how it worked — and how you could use a simple audio oscillator for the same job, in a modern solid state set. And it's a lot cheaper than having to use a CRO and signal generator, Mr Fox, regardless of what you may have been told!

In fact I do hope that the comments we've been able to pass on from experienced 'real world' techs like Brad Sheargold, Doug Thwaites, Andrew Blight and Paul Hetrezelis *will* encourage Mr Fox and other youngsters like him with their eyes set on servicing as a career. To me, they show just what *can* be achieved on the service bench, with just a bit of ingenuity and imagination to replace a lot of fancy test gear.

As most of our techs have suggested, in one way or another, the only really essential requirement for successful servicing is a sound basic understanding of how the equipment concerned works. Once you have that, you're probably going to be able to fix almost anything — even with only the most basic of test gear.

Of course a decent CRO is an extremely valuable tool in almost every aspect of servicing, as most technicians seem to agree. But as Doug Thwaites suggests, you can even get away without a CRO, if you really apply the old grey matter!

Thanks again to the above service techs who took the trouble to write in and offer such practical advice and encouragement.

More on big pics

To end up this month on a different topic, I'd like you to read an e-mail that arrived shortly after the July issue was published, with my own feature article about large-screen video display technology. The e-mail is from Mr Bruce Withey, of Mylneford in NSW, who offers some corrections and further information about a few of the devices I tried to explain in that article.

Mr Withey's comments are quite constructive and informative, and I think you'll find them as interesting and helpful as I did:

I am writing in response to your articles on Video/Data projectors in the July magazine. It seems that you may not have had the opportunity to examine all of the available types in detail, since there were many errors and omissions in the articles. So perhaps this list may help you for the future.

1. Three-panel LCD projectors do not have a combined pixel count of three times the individual cell unit. E.g., for a 1024 x 768 pixel screen the effective total pixels (image resolution in your terms) is 786,432, not 2,359,296. Why? Because the pixels from each of the three cells are superimposed on the screen so that each pixel has a brightness and a colour, totally different to CRTs and plasma screens. Single-cell LCD projectors do have the RGB pixel structure but not three-cell types.

2. The separation between pixels is not due to the need to make connections to each row and column. They use transparent electrodes, but rather due to the need to separate the LCD effect from one pixel to another. The effect is less apparent on three-cell types due to slight misalignment of the images from the three cells.

3. DLP projectors similarly have superimposed pixels from three-cell types. The single cell DLP units have a rotating colour disk so that each frame is shown as a complete single primary colour rapidly followed by separate frames of the other two primary colours. Consequently there is some colour flicker in this type of projector even if it is very rapid. This approach works because the response time of the DLP cells is extremely rapid.

4. The CRT screens have pronounced flicker and badly affect some people (like myself). I cannot view a computer screen for more than a few minutes unless it is LCD or has a high refresh rate (72Hz seems to be the lowest that suits me). I go to sleep! (Yes, it is an epileptic effect). The LCD and three-cell DLP projectors do not appear to have any flicker to me.

5. DLP projectors are not that new. It is just that Australian dealers/importers do not seem to be prepared to bring them here. They can be bought easily over the Internet though.

6. Setup for LCD video projectors is best if it is set so that the cells are slightly out of focus. The actual video content does not appear to be affected. Try it. In any case, with prolonged use the pixels become invisible to the viewer at the same distance. It is only when you change position that they reappear.

7. All modern CRT screens are pixelated in any case, whether with dots, rectangles, squares or stripes, for the three primary colours. All produce artifacts on slowly moving images, which are viewable with the tendancy nowadays to sit close to the screens. It is a quite small effect however.

8. The four plasma screens that I have viewed had limitations in the number of colours that could be produced. This was noticeable on large areas of almost the same colour. A similar effect can be produced from a computer image programme in which the colours are reduced to about 256.

9. All CRT projectors (three-colour) suffer from convergence and alignment errors, giving colour fringing especially in the corners. Every rear projector set that I have seen shows this problem. Also rear projection sets have a narrow viewing angle and tend to have a hot-spot at some locations.

10. The cost of the projection lamp with LCD and DLP projectors needs to be mentioned. The whiter types are usually more expensive (hundreds of dollars) and can be a significant running cost.

11. DLP types have much higher contrast ratios, which becomes very apparent when a less reflective (darker) screen is used.

These comments came from observations on units that I have used (borrowed or hired) or seen at other locations (clubs, conferences, suppliers and retail outlets). Whilst I would like to own a video projector, those that I would choose are outside my price range.

Thanks indeed for those comments, Mr Withey. As you rightly guessed, some of my own comments were not based on direct hands-on experience, because I still haven't had the opportunity to try out any DLP projectors. I appreciate your taking the time to give us all the benefit of your own experience, and I'm sure may readers will have found your comments quite helpful too.

By the way I fully agree with your comment about the video from LCD projectors looking better if the cells are thrown slightly out of focus. I've certainly found this too, and I agree that the video doesn't seem to be degraded. The 'edge jaggies' certainly seem to become much less visible, though — don't they?

You're quite right too about the surprisingly high cost of replacing some of the 'UHP' and similar technology projection lamps used in some of the LCD and DLP projectors. I should have noted that aspect in the original article, and I'm grateful that you've corrected that omission.

And that's it for another month. I hope you'll join me here in the Forum next month, if the fates are willing. ❖

SERVICEMAN

Mislabelled parts, and the problems they can cause...

If you're repairing, servicing or building electronic equipment you have to assume that component labelling is correct. The trouble is, this isn't always the case...

It's not always that electronic servicing consists of finding and replacing faulty parts. It can also consist of finding and fitting suitable parts. If that sounds like twisted logic, our first story this month will explain all.

It comes from Brian Knight, of Evandale in South Australia. In his story, Brian relates the problems of finding a suitable replacement part, compounded by inaccurate labelling etc. As you read Brian's saga, you'll find yourself saying, "...been there! Done that!" Yet all's well that ends well, as you'll see...

In my electronics work area (actually an old desk and some shelves in the household laundry!) I have a small stereo amplifier that I use for test purposes and occasionally, for listening to music.

The amplifier I use is based on a pair of Bipak AL60 modules, which I bought from DSE back in the 70s. These are installed in a small box with a 35V 1A power supply. Despite the relatively basic circuitry these modules produce a surprising amount of power.

The downside is a tendency to instability, and on a number of occasions I have had to revive a module with new output transistors when they succumbed to heat exhaustion. Not surprisingly I have been on the lookout for something better, but without wanting to spend too much money.

My need was met when EA published Al Younger's design for a 'Nifty Twin Fifty', based on the TDA1514A IC (April 94, pp.56-61). I didn't have the ICs, but I had on hand a strong 150 x 200mm aluminium case, all the small components, and a pair of 10,000uF 40V PCB-mounting electrolytics.

I also had a suitable chunk of heatsink, acquired during a very timely visit to Altronics in Perth when they had some 50-70mm offcuts of 130mm wide heatsink on special for $1 a piece.

As well, I had a well-shielded Ferguson PL40/40VA transformer with two 20V secondaries. This should deliver 28V DC under full load, a few volts more under no-load conditions. This transformer (sadly no longer available) is rated at 40VA, not enough to allow the amplifier to deliver full power but more than adequate for my purposes.

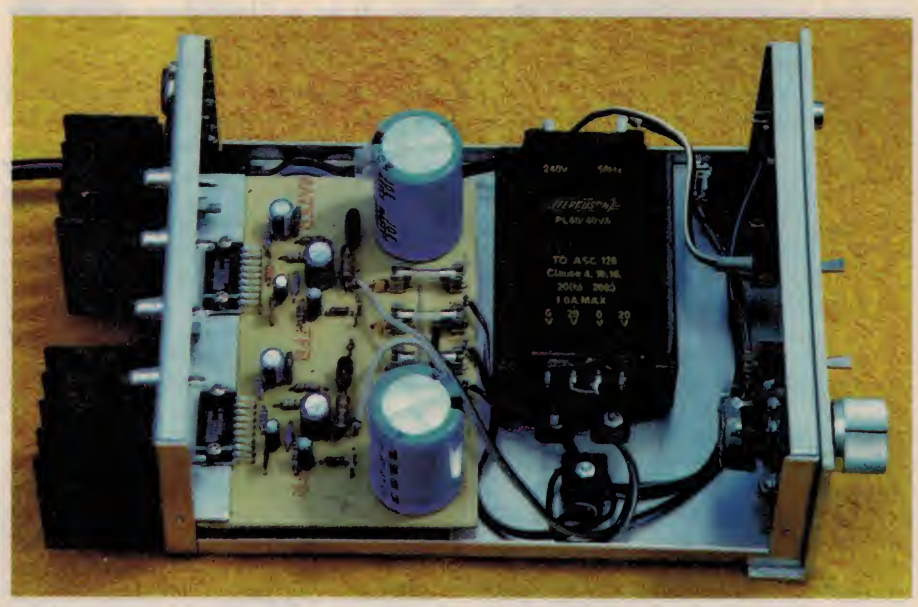
My plan was to create a compact yet functional stereo amplifier to replace the existing one. It would have some basic facilities: two inputs (switched from the front panel), a volume control, and a headphone socket which would switch the speaker outputs. I made up a PCB following Al Younger's layout, with the only significant change being to extend the board to accommodate the filter electrolytics and fuses.

I assembled the PCB and installed the components in the case for testing, as shown in the photograph. The layout is fairly tight, as you can see, and I particularly wanted to test the amplifier modules before completing the remainder of the wiring, as access would then become more difficult. Sadly, for reasons that will become apparent, the neat little unit shown in the photograph was never completed and has since been dismantled. Here's that story.

Before switching on I carefully checked the PCB for shorts and solder bridges, and I also checked the main supply rails for shorts. All seemed well, so I installed the fuses and switched on. All still seemed well until I checked for DC and AC on the speaker outputs, and found several volts AC. I didn't try to measure the exact voltage; I just made a desperate grab for the on/off switch. But I knew I was too late when one of the fuses blew before I could switch off.

In an instant all my high hopes turned to disappointment. After an expletives break, a drink or three, and a few nights of sleep, I sat down to tackle what must be the most depressing job for any electronics hobbyist, — namely, finding a fault in a newly built piece of equipment.

I removed the fuses and checked the power supply. With no load connected the rails measured +/-34.5V. This seemed very strange for a standard bridge rectifier connected to 20/0/20V AC. At this point omi-



A view inside Brian Knight's workshop amp, showing the Ferguson 40VA transformer at centre right, just behind the front panel. Was it mislabelled, or merely a case of poor regulation? (These 'ballast style' transformers were a little weak in that area...)

nous thoughts about 30V being the absolute maximum supply voltage for the TDA1514A started to bounce around in my head.

Trying hard to be optimistic, I checked the AC voltage at the transformer. It measured just over 24.3V a side. Now I am accustomed to transformers delivering around 10% above their rated voltage without a load, but 22% high seems excessive. At 245V the mains voltage was slightly high (2%), which is usual in my part of Adelaide but certainly not enough to account for the excess voltage on the transformer secondary.

Later checking showed that the secondary windings have a total DC resistance of 3Ω (i.e. 1.5Ω each). From this, and the 1A rating, I would expect the no load voltage to be 1.5V higher than the nominal voltage of 20V, perhaps 2V at the most, but certainly not 4.3V.

Yet as you can just see in the photograph, the transformer was labelled clearly as a 20V type with a 240V primary. I even checked all my voltage measurements with an old multimeter, just in case my DMM had decided to start reading high. No joy.

At this point I gave up in disgust. I did not have a suitable alternative transformer on hand and obtaining a replacement to fit into the same space as the PL40/40VA would be difficult. And whatever I did, it was clear that my 'cheap little amp' was going to cost a few dollars more than I expected.

As a result the project sat on the shelf in disgrace for a couple of years. During that time I managed to acquire a 17.5-0-17.5V, 120VA transformer, with a 12-0-12V winding as a bonus. Jaycar were selling these off for $15 each, a real bargain.

Ironically, I bought the transformer believing it to be a 21/0/21V type, but someone at Jaycar had put the wrong part sticker on it (it was labelled MM2016 but was actually MM2014). In view of my previous experience with excessive voltage it was probably just as well! The new transformer did not have an electrostatic shield but this would be easy to add because the mounting brackets were attached to the core with bolts, not crimped as is common these days.

Solving one problem did create another, though. If I were to use the Jaycar transformer, which is physically much larger than the Ferguson PL40, I would need to house the amplifier in a larger case. I was prepared to face that, but first I needed to be sure that I could get the amplifier modules working. The Christmas break gave me the time needed for the necessary fiddling.

Short fuse

Using the Jaycar transformer and a diode bridge I rigged up a temporary power supply, which delivers a conservative 24.5V to the TDA1514A ICs. With this supply, one channel appeared to be working though with a slight buzz. The other persisted in blowing its fuses, and shortening mine. As far as I know there isn't an easy way to test power ICs.

However, I noticed that the resistance between adjacent pins of the TDA1514A in the good channel was generally 3M or higher, whereas in the bad channel the readings were less than 500k. This surely pointed to the IC. Just to be sure I installed the apparently good IC in the dud channel and it worked, though I still had that slight buzz.

As soon as the shops reopened after Christmas I bought a replacement IC and installed it. To my relief everything worked fine. However, I still had the buzz, and now in both channels. It sounded like an earthing problem, except that the only earth paths in use at this stage were on the PCB as there were no external connections.

I wondered whether the layout I had used in extending the board to accommodate the filter capacitors and fuses was the cause of the problem. In fact, I found I had made an elementary and quite silly mistake with the earth track. I had failed to keep the earthed connection between the two filter electrolytics separate from signal paths.

A simple modification to the PCB fixed the problem. With no input connected there is now no detectable noise or hum in the speakers even with an ear close to the cone. And the sound quality is very clean, too. Now all I have to do is find a larger aluminium case to house it all!

I have learnt numerous lessons from this whole episode.

One is a reminder to check the power supply properly before connecting it to a new piece of equipment. Always!

Another is to replace the DC fuses with resistors when firing up for the first time. I have built many high-power amplifiers where one starts with resistors in place of the fuses, but I did not do this here because IC amplifiers like the TDA1514A don't require the quiescent current to be set.

Thirdly, the hum problem has reminded me, yet again, just how critical and unforgiving earthing can be in audio amplifiers.

Finally, I must allow for the possibility that components might be labelled incorrectly. I suspect that my Ferguson PL40/40VA transformer was actually meant to be a 22/0/22V type, but I will never know for sure.

Also, somebody at Jaycar had accidentally mislabelled a transformer, albeit a disposals type. This comedy of errors with transformers must set some kind of record.

I can only ask, Why me?

I don't know, Brian. And I don't think anyone else would be prepared to offer an explanation, either. I think it has something to do with a fellow named Murphy.

Your problem with the transformer will be familiar to anyone who has tried to build up a project from 'junk box' parts, even brand new parts. Nominally identical parts never are, and finding ones that will fit can take forever.

Then incorrect markings complicate the problem beyond belief. Wrong markings on brand name parts are fairly rare, but cheap Asian generic parts are fair game for the aforesaid Mr. Murphy. He'll see to it that only the last and most vital part will be wrong specs, wrongly marked, too big (or small) and burned out anyway!

(Editor's Note: From memory, those old 'ballast style' transformers were a bit poor in terms of load regulation, so the transformer in question may not have been wrongly labelled — just not the best choice for this type of project, in hindsight.)

All of the above says volumes for the benefits of kit projects, assembled by responsible distributors and containing parts guaranteed to do the job (or replacements

gladly provided!) I have tried both kinds of projects and I'll freely admit that only the kit type were properly completed and worked as promised.

And of course, Brian, your admonition to check the power supply carefully before connecting it to the apparatus goes without saying. If it's not practical, say by removing fuses, then cutting tracks is a legitimate alternative.

Then your hum problem is one that would only show up after a re-design or rearrangement of critical wiring. It's not something that would show up in a straightforward construction job. Just the same, it's something to bear in mind...

Thanks for that story, Brian. It provided several cogent reminders for would-be constructors.

Red face

Now, to our final story for this month. It comes from Barry Hubble, of Moulden in the Northern Territory. Barry calls his story 'Redface' and you'll see why when he gets to the crunch-line. But he shouldn't feel too bad. Most of us could relate a similar embarrassing mistake. Here's Barry's yarn....

Being an electronics technician (now retired) I naturally still get the odd repair job. About six months ago a family member's TV suffered damage from a lightning strike power surge and he asked if I could take a look at it.

He had removed the back and said he could see a burnt area on the circuit board and could smell that something had cooked. The burnt area appeared to be under and adjacent to an IC and it seemed that this chip had suffered some damage, although the symptoms indicated that power supply faults were also present and it was difficult to determine where the burnt smell was originating from.

I couldn't read the type number on the IC as it was now covered by a sooty black film, but the circuit diagram of a similar model TV indicated it was most probably an LA7910. Since I didn't have an LA7910 or a circuit diagram, and mindful of the other as yet unidentified faults, I suggested it would be more expedient to have it repaired by a TV repair firm.

This course of action was followed, and the comprehensive repair invoice listed all the parts that had been replaced (all in the power supply) and did not mention the IC in question.

Then recently the TV developed an intermittent fault in the colour circuitry, and while I had the back off I decided to check if the LA7910 had indeed been replaced. The IC was original and was apparently working fine, but it still worried me that it had sustained damage on the previous occasion so I decided to replace it anyway.

I desoldered eight of the nine inline pins but one was not accessible with the desoldering iron, so I asked the owner to grasp the chip with long nose pliers and pull it out while I melted the solder on the remaining pin with a smaller iron.

He was having some difficulty with this task and jokingly remarked that it felt like the chip was glued to the board.

The penny dropped and what a fool I felt to realise that the sooty film and 'burn' marks were really a black glue used to hold the chip in place during the manufacturing process...

See why Barry complained about a red face? And to involve the set's owner as well. Oh dear!

Still, as I said earlier, we have all made mistakes something like that. I recall once having great trouble removing the tuner from a colour TV, in the end smashing part of the mounting panel. Once out, it was obvious that removal of two easily accessible screws would have released the entire tuner and front panel assembly. That lesson cost me dearly.

Thanks for your story, Brian, and I think most readers will watch out for black glue in future. I know I will.

That's all for this month. I'll be with you again next time.❖

Test Istrument Review

(Continued from page 23)

At the rear there are two DB25 connectors (right). The lower of the two is for the interface cable back the PC's printer port, while the upper one provides the expansion port connections.

The only minor exception was the unloaded output setting accuracy of the programmable 0 - 12V power supply, which measured around -1.27% over most of the adjustment range, a bit outside the rated 0.5% +/-50mV except for fairly low output levels.

We found the instruments generally quite easy to control and manipulate via the Windows utilities, too, although some of the 'slider' adjustments were a bit fiddly. Those for setting the DSO's voltage and time/frequency measurement cursors were a bit slow if you used the end buttons, for example, yet trying to drag the elevator button directly almost invariably turned out to give drastic 'overshoot' past the setting you wanted...

We also found the DSO triggering level a bit tricky to adjust, because the software doesn't indicate the triggering level on the screen display — you have to adjust it 'blind'.

At the back of the GS2020's user manual there are a couple of web site URLs given for ongoing software support, so we tried visiting these in case there were later versions of the software available. Both of these URLs seem be out of date now, but we were redirected to another site (http://gs2020.open.ac.uk) where we did find some support information — including what is effectively an online version of the user manual. And although the site does allow you to download the latest version of the GS2020 software, this turned out be the same version (V1.04) supplied on the floppy disks.

Hopefully things like the lack of an on-screen indication of DSO triggering level will be remedied in later updates of the software, when they do appear.

Overall, though, we found the GS2020 and its software a well conceived system, and one that does indeed seem to provide a practical and nicely performing 'basic electronics lab in a box'. Our only real disappointment is the price: at the quoted figure of $1983.64 (plus 22% sales tax if applicable), it's probably going to be beyond the reach of most individuals, especially students.

Apparently there is a 10% discount for educational institutions, though, so as universities and tech colleges are exempt from tax they will hopefully be able to afford them. ❖

DICK SMITH ELECTRONICS

Where do you go for the latest in electronics?

GREAT LOW PRICE!

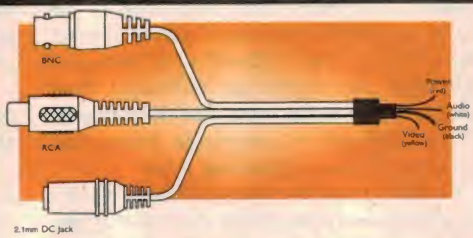
Adaptor 9V DC 200mA

We have a cancelled order on these adaptors and as a result, our customers are receiving the better end of the deal!

M 9614A

JUST $5

CANCELLED ORDER



Audio/Video/Power Cable

Cable features a BNC socket for video, RCA socket for audio and a DC power socket on one end and bare cable on the other, making it ideal for connecting a camera module.

L 5879

$9.95 NEW

Mini Tripod

A sturdy tripod that suits cameras, night viewers, sound level meters etc.

L 8205

Sound level meter not included

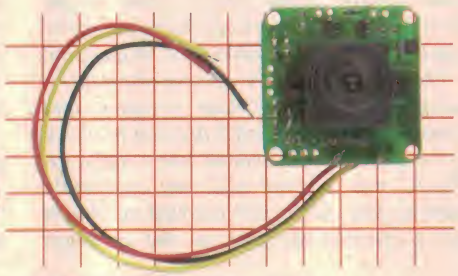
$12.20 NEW

8X Monocular Telescope

Ideal for viewing sporting events, security, bird watching, hiking or at the concert or theatre. Features 21mm coated lens.

L 8201

$29.80 NEW



CMOS Camera Module

Maximum illumination 1 lux at F1.4, Power source: 12V DC (20mA) Pixels: 352 x 288, Resolution: (TV lines) 240 S/N Ratio: >46dB Lens: 3.6mm/F2.0, Size: 28mm x 28mm x 37mm, Can be connected to a TV or VCR.

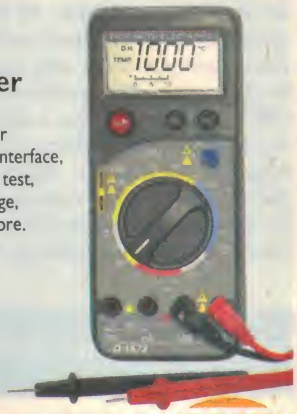
L 5874

$69 NEW

Digital Multimeter

A high quality digital multimeter with RS232 PC interface, continuity/diode test, 20A current range, logic test and more. This unit comes complete with software and leads.

Q 1573



$179 NEW

DISCOVERY SERIES

KIT CREATIVITY

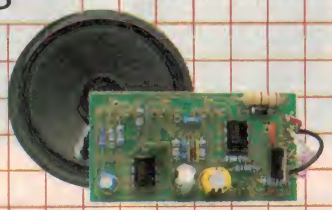
HALF PRICE!

Power Supply Kit

- Regulated output: 1.2 to 37.5 volts,
- Current: 1.5 amps
- Current and overload protection
- Can be configured as a fixed or variable voltage regulator, voltage regulator with programmable current limiting, combined voltage/current limiting or constant current source
- Power source required: 4-28V AC
- Supplied with components and PCB

K 2808

$9.25



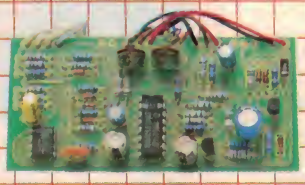
HALF PRICE!

Siren Generator Kit

- Create four different siren sounds
- Power source required: 6 or 9V battery
- Supplied with components, PCB and hardware such as switches, battery snap and speaker
- Case optional (use H 2853)
- PCB size: 33mm x 62mm

K 2801

$9.95



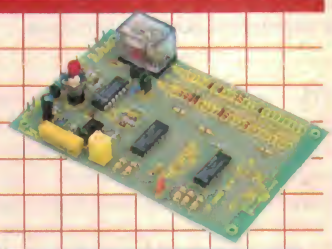
HALF PRICE!

Wave Form Generator Kit

- Frequency range: 10Hz to 100KHz
- Amplitude and frequency are voltage controlled
- On board voltage regulation ensures good stability
- Power source required: 9V battery or any DC supply between 8.5 and 15 volts
- Supplied with components, PCB and hardware such as pots and switches

K 2802

$10.25



HALF PRICE!

Multi-Timer Kit

- Timing range between 0.1 seconds and 19.4 days
- Can be configured for single cycle operation or continuous repeat until reset
- Power source required: 9V-12V DC
- Supplied with components and PCB
- Case optional (use H 2851)
- PCB size: 74mm x 113mm

K 2807

$13.45

DICK SMITH ELECTRONICS

That's where you go!

Where do you go for the best in electronic kits?

DICK SMITH ELECTRONICS

Video Title Kit

- Use your PC to layer text over a video signal.
- Ideal for video titles, etc.
- Software included with kit
- Programming done through parallel port
- Power supply: 12V DC
- Includes all components, PCB and comprehensive instructions

K 5417

$37.95

Bracket shown not supplied with kit

EA Aug '99

Auto Headlight Switch

- Headlights automatically switch on at reduced brightness when car starts.
- Dark sensor switches lights to full brightness at night time and in low-light conditions.
- Powers headlights rated up to 200W total and EMI suppressed. • Headlight switch works normally and overrides circuit operation.
- Daytime lights activated only after engine starts.

K 4309

$48.95

Silicon Chip Aug '99

Electric Fence Controller

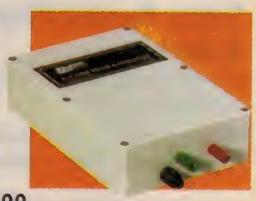
Higher output than previous design - up to 5km multi-wire fence length. Design uses DC-DC inverter to supply 390V DC

- Power supply: 12V DC
- EMI suppressed output
- Much cheaper than commercial units
- Includes high-quality sealed, weather-proof case worth $29

K 3009

$79.50

Kit Fence Voltage Tester
K 3011 **$17.50**
Kit Fence Flasher
K 3013 **$17.50**



Silicon Chip Apr '99

Mains Monitor

- Great for rural areas or where applicances need to be protected against mains fluctuations.
- LED meter to indicate voltage level.
- If voltage falls outside pre-set range, power is switched off.
- User-selectable delay time.
- LED indicator shows if switch has been activated.
- Includes punched & screened front panel, case, and all components.

K 7207

$99

EA Jun '99

Guitar Compressor

- 9-12V DC power
- Acts as an auto level control
- Audio effects including compression, sustain and limiting
- Accepts signals from guitars, microphones or similar
- Kit includes all components, PCB and instructions

K 5621

$29.50

Silicon Chip Mar '99

We'll reward you for waiting!

Our rigorous in-house kit testing process ensures that any Dick Smith Electronics kit will have been substantially debugged before release. This process may sometimes delay our kits. We're so sure that they are worth the wait, that we'll offer a genuine 10% discount off the price of any new kit, provided that a fully paid order is placed after the release of our advertised offer and prior to stock being initially recieved in our retail stores.

KIT UP FOR HOME THEATRE!

Surround Sound Decoder with Delay

Build your own analogue surround sound decoder and save! A time delay is used to create an echo effect, adding a feeling of spaciousness to a recording. A single front panel allows you to select a rear channel delay of 0ms, 15ms, 20ms, 25ms or 33ms. The main use for the delay is to improve the direction and clarity of the front channels. Use this kit to add to the surround sound effect in your home! Kit contains PCB, case, front/back panels and all components.

K 5409

$99

EA May '99

15W "Brick" Stereo Amplifier

This compact unit delivers 15W per channel in stereo, so you can add extra channels to your home theatre setup, eg rear or centre speakers. Easily hidden due to its size, it accepts line output from any source. Also great as a bench amp. Use this with your Surround Sound Decoder kit (K 5409) for a low-cost home theatre setup! Includes deluxe pre-punched black case, front panel label and all components.

K 5609

$93.50

EA Jun '99

Sub-Bass Processor

- Add oomph to your home theatre with this kit!
- Correct and enhance the low-end response of sub-woofer-style speakers.
- Can be easily installed in an existing amp, powered sub-woofer or just build it as a free standing unit.
- Includes a bypassable filter, variable gain (+/-12dB) input stage and more.
- Can be driven from speaker or line level input signals.

K 5403

$24.50

EA Sep '99

direct link

Direct Link is equipped with the service centre to supply you with a hassle free delivery direct to your door. PHONE 1300 366 644 to place your order

A394-B 4078

Availability: Our kits consist of many different parts from numerous suppliers. Whilst we have consulted closely with them and are satisfied as to their ability to supply, sometimes problems can arise in obtaining all of the parts. This means there is a slight chance that availability may be delayed. Rainchecks are available, however if you'd like to check beforehand, please don't hesitate to contact your local store.

DICK SMITH ELECTRONICS

That's where you go!

DICK SMITH ELECTRONICS

Where do you go for the greatest electronic deals?

Safety Banana Plug & Sockets

$1 ea

Professional plugs and sockets as used in high-end test equipment.

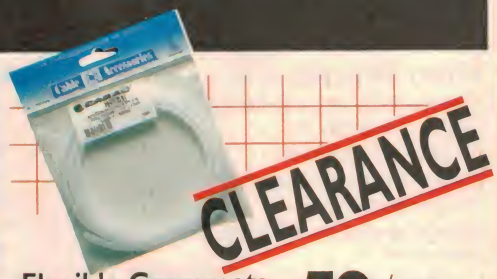
Piggy back – red P 1700
Piggy back – black P 1702
Sockets 4mm red P 1728
Sockets 4mm black P 1729

Programmable Rotary Switch

$2.30 ea

Program the positions you require.

3-Pole 2-4 Pos P 7516
1-Pole 2-12 Pos P 7518
4-Pole 2-3Pos P 7520
2-Pole 2-6Pos P 7522



Flexible Grommets

50¢ ea
Save up to 87%

1.0mm 2m long H 1720
1.6mm 2m long H 1721
2.4mm 2m long H 1722
LIMITED STOCK

Tantalising Tantalum Capacitors

35¢ ea

0.1uF 35V R 4700
0.22uF 35V R 4705
0.33uF 35V R 4710
0.47uF 35V R 4715
0.68uF 35V R 4717
1.0uF 35V R 4720
2.2uF 35V R 4730

Miniature Heavy DutyToggle Switch

$2.95

120VAC 10A
P 7652

Blow Torch Soldering Iron

Butane powered soldering iron with blow torch attachment.

$36.90
T 1396

BONUS Worth $14.45

200g Can of gas, valued at $7.50
N 1092

2.5mm replacement Soldering tip, valued at $6.95
T 1407

LM627 Low Noise Precision Op Amp

$2.40

Direct equivalent to the OP27.
Z 6023

CA3080 Transconductance OP Amp

$1.80

Z 6024

LM7809CT 9V 1A Voltage Regulator

75¢ ea

Z 6550

We've Screwed the Prices Down on These!

50¢ per pack

Self tap Torx Screw Pack of 20 H 1100
Bolt Security Torx
M3 x 9mm Pack of 10 H 1102
M3 x 12mm Pack of 10 H 1104
M3 x 25mm Pack of 10 H 1106

HALF PRICE!

CLEARANCE

Rack Cases

3U 19" 424 x 332 x 127mm H 2686 $49 HALF PRICE!
2U 19" 424 x 254 x 81mm H 2684 $44 HALF PRICE!
1U 19" 424 x 254 x 38mm H 2682 $34 HALF PRICE!
Limited stock

DICK SMITH ELECTRONICS
That's where you go!

Where do you go for test equipment and tools?

DICK SMITH ELECTRONICS

Ceramic Philips Screwdriver — 75¢

You'll find these high-quality adjusters perfect for computers, communication instruments, VCR, CD and other electronic devices that require non-metal tools.

T 5208 **Limited stock**

Flat Nose Pliers — $5

Stainless steel construction, these pliers are great for working with small components and general printed circuit boards.

T 3311

1.25mm Solder — $19.95

Buy this 500g roll and receive a BONUS dispenser worth $19.95

N 1650 **AMAZING VALUE!**

Handheld Mini Vacuum Cleaner — $22.95

Don't get sucked in by other vacuums, this handy unit is great for cleaning small areas. Quality Japanese construction.

T 1705

Digital Soldering Station

Designed for use in production line and heavy duty servicing applications, the Weller WSD80D provides a high 80W power rating, fast response silver wire heater element, and adjustable 150–450°C temperature control. With ESD-safe casing, +/- 2% metering accuracy and measures just 16.5x11.5x 10cm (LWH)

T 3900

$299

SAVE $200

HURRY! While Stocks Last!
Only 8 pieces available

AVAILABLE POWER HOUSE & direct link ONLY

ANALOGUE MULTIMETER CLEARANCE

16-Range Analogue Multimeter

With easy to read 3-colour scale, instruction manual and battery test.

Q 1004

$8† SAVE OVER 50%

12-Range Analogue Multimeter

With in-built diode and fuse protected, this unit has mirrored scales and off position for meter protection.

Q 1006

$15 SAVE $10.50

19-Range Analogue Multimeter

Features diode, 10A DC current range, dB, 20k/volt sensitivity, carries handle/tilt stand and more.

Q 1025

$25 SAVE $19.90

26-Range Analogue Multimeter

Features DC/AC volts 0-1000V, DC current 0-10A (separate jack) Resistance 0-50Mohm, temp. range -50°C to 260°C. Includes built-in stand and handle.

Q 1007

$50† SAVE $34

† Limited stock

PHONE, FAX & MAIL ORDERS

direct link

PHONE: 1300 366 644 (Local Call Charge) **FAX:** (02) 9395 1155

MAIL: **DICK SMITH ELECTRONICS,** Direct Link Reply Paid 160, PO Box 321, North Ryde NSW 1670 (No Stamp Required)

Please add postage (up to 5kg) to your order, as follows:

• $4.00 ($1 Up To $50) • $7.50 ($51 Up To $100) • $9.00 ($101 Up To $500) • $11.00 (over $500)

(quote available for air/road freight or if over 5kg) email: directlink@dse.com.au (enquiries only)

Major Credit Cards Accepted • Gift Vouchers Available

Not available at all authorised stockists.

NEW STORES AND RELOCATIONS

NSW

Moore Park	PowerHouse, Moore Park Supa Centa, Cnr South Dowling St & Todman Ave	Ph: 9697 0244
Chatswood	411, Victoria Avenue	Ph: 9411 1955
Bondi Junction	100, Ebley Street	Ph: 9387 1444
Glendale	Shop 20, Stockland Super Centre, 389 Lake Road	Ph: 4956 9940

A394-B 4078

DICK SMITH ELECTRONICS

That's where you go!

Vintage Radio

BY ROGER JOHNSON

'Battery-Electric' portables

The battery-electric valve portable is about the least desirable of all vintage radios. However they combine battery valves with an inbuilt power supply, and often they actually work very well. As for the rather dubious 'battery reactivation' feature most of them offered, this can only be described as the electronic equivalent of 'snake oil'.

WE HAVE ALL seen them. They come up at vintage radio auctions, whether an organised society function or a weekly mart. These 'things' come up, no-one wants them and the auctioneer just about gives them away. "Well — who will give me a dollar... one dollar? No...? Ok, put it with the next lot..." It's a scenario all too familiar.

But what exactly are we talking about? The very last of the battery valve portables, which were superseded by the transistor portable. They were generally large, came in plastic cabinets, and from about 1953, many manufacturers combined an inbuilt power supply — so that batteries, which were becoming quite expensive again, need not be used wherever 240V AC was available.

Fig.1: Two examples of the last models of battery-electric valve portables, one by Astor and the other by Kriesler.

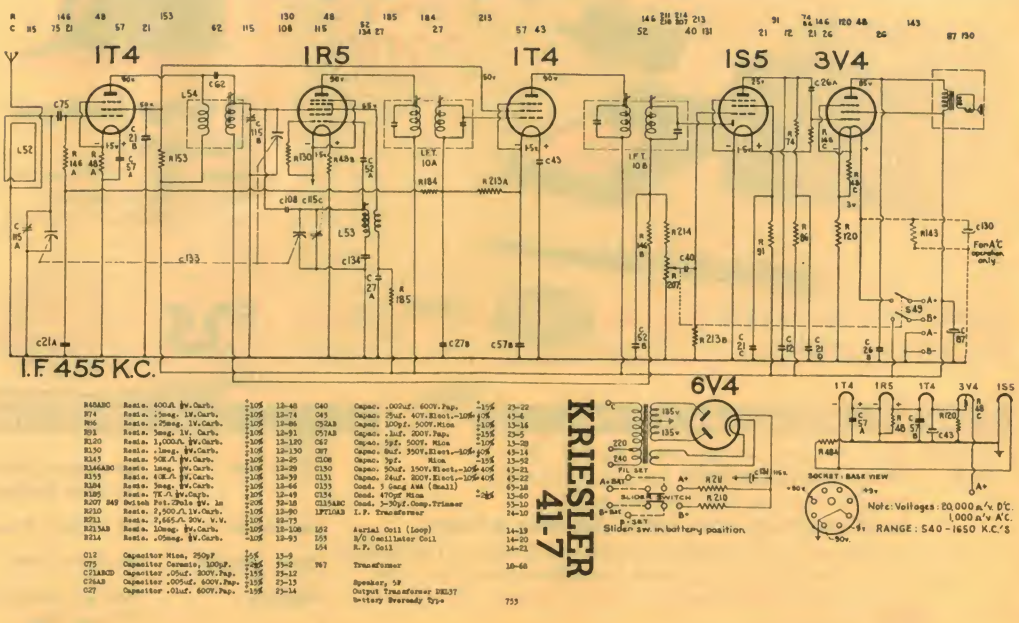


Fig.2: The circuit of the Kriesler 41-7 battery-electric portable of 1952. When running from the AC mains, the 6V4 rectifier provided current for the valve filaments as well as the B supply.

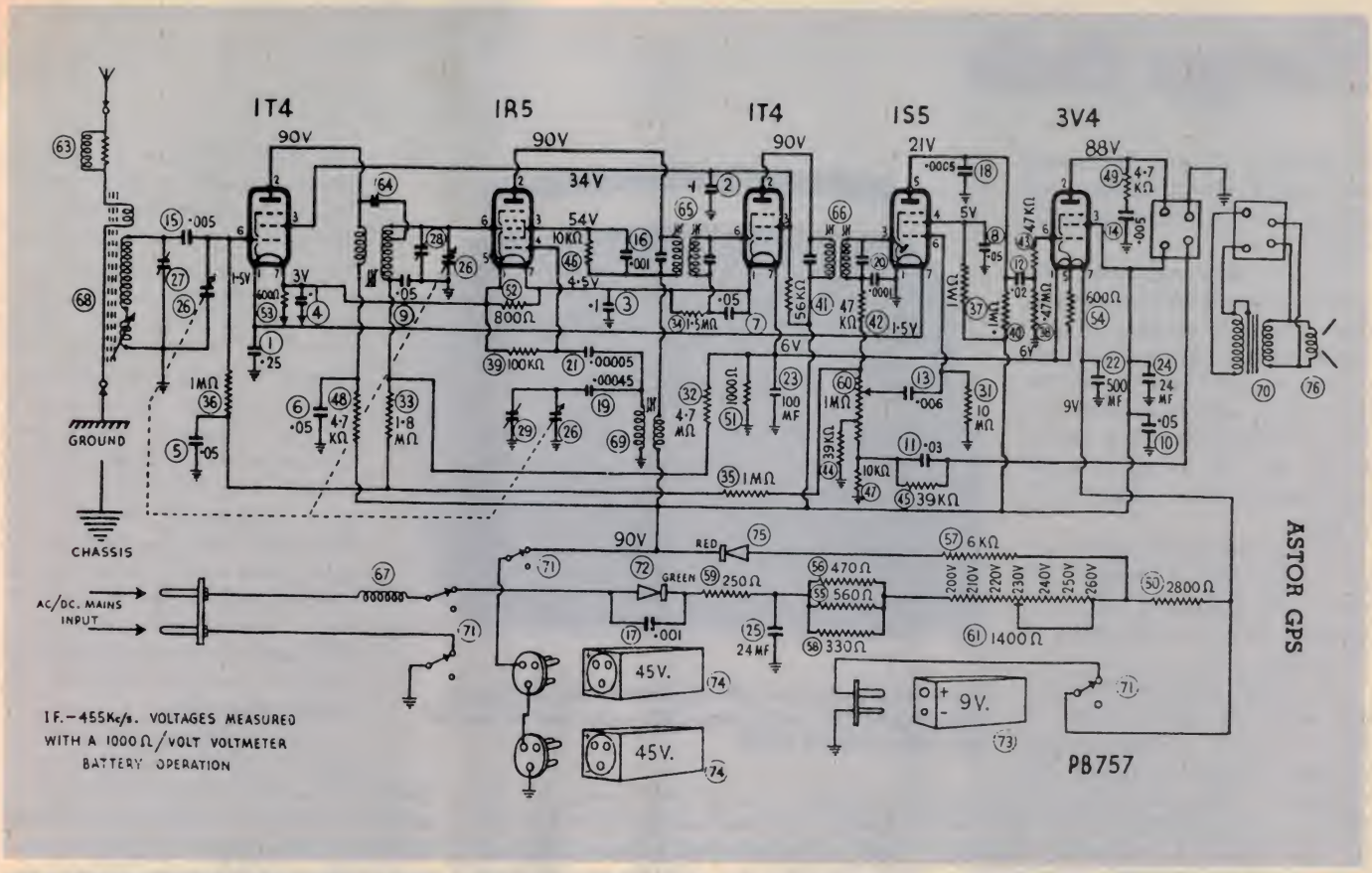


Fig.3: The circuit of the Astor GPS of 1955, with a similar valve lineup — but a rather weird form of battery 'reactivation'.

Batteries were going up in price mainly because the volume produced was decreasing. New battery radios were either vibrator powered, or were as described above, and from about 1957, more and more transistorised radios appeared on the market. It is hard to know just when the last of the battery valve models were made, but it is very doubtful that they were produced after 1960.

Just in case there are those whose memory needs a jog, models by Astor and Kreisler are shown in Fig.1. AWA made theirs in a maroon case with pale cream knobs which fitted into the corner of the dial escutcheon such that only a quarter of the circumference was seen. Philips models were generally grey front and back, with maroon ends. Healing and STC were most often all cream, some with maroon (again) inserts for the speaker grille.

Design considerations

In reality, there were only five principal 1.4 volt 'peanut' valves that were used by manufacturers in these models, from their Australian introduction in about 1947 until the end of manufacture. There are no prizes for guessing: they were the 1T4 RF/IF amplifier, the 1R5 mixer, the 1S5 single diode detector/audio, and either the 3S4 or 3V4 output valve.

Toward the very last days of battery valve manufacture, two new types were introduced: the 1U4 RF/IF amplifier, and the 1U5 diode/pentode. However, radios with those types are not common. The 1U5 is nothing more than a 1S5 with different base connections!

Because of the restriction in available valve types, there was little room for experiment, and the vast majority of these radios fell into two categories: a four-valve version using a lineup of 1R5, 1T4, 1S5 and 3S4, and a five-valve version in which the fifth valve was another 1T4 used as an RF amplifier — which meant a three gang tuning capacitor. As there is only a single diode in the type 1S5, simple AGC only could be used, and whichever circuit configuration was adopted, the earlier versions had a 'loop' aerial coil, while the later versions had one of the new ferrite rod 'loopstick' coils.

There were practically no other variants such as two IF stages, or paraphase push-pull output or anything like that. Only the larger cabinet models seemed to have provision for short waves. In fact I have yet to discover this facility on one of the battery/electric portables, at the time of writing.

One or two manufacturers made a daring foray into audio feedback from the voice coil of the speaker via an elaborate tone compensation network which was fed into a tapping on the volume control at about the 100k position. However with limited gain and only 270 milliwatts of output capability, any sort of audio feedback will ultimately reduce the power delivered to the speaker to a greater or lesser degree. Hence, it was most often dispensed with.

Kriesler's 41-7

The circuit for a Kriesler model 41-7 of 1952 vintage is shown in Fig.2 and nicely illustrates the point. Here we have a five valver, with an RF stage incorporating a loop aerial, AGC to all stages via R146B and R146A (both 1MΩ) R184 (3MΩ) and R213A (10MΩ) and bypassed via C21A and C27B. Notice, though, that the grid leak for the output valve is not returned to earth, but instead to the positive pin of the 1S5. This does seem strange, for returning it to earth would mean an effective grid bias of 6V, about the right figure.

So how were the valve filaments powered? Although copper/copper oxide rectifiers had existed since the late 1920s, and the new selenium bridge rectifiers were making their way onto the market, particularly for domestic battery chargers, they had not been fully developed for 1.4 volt valves. There are arguably two reasons; firstly there was no need, and secondly, adequate filtering would have been a problem. Remember that the highest value of electrolytic capacitor available at the time

was 500uF at 12 volts. The answer was a series network similar to the network used in vibrator powered radios.

The chief advantage of the 1.4V 'peanut' valves is that in most cases their filaments consumed only 50mA. Both the 3S4 and 3V4 output valves had a centre-tapped filament which allowed for either 1.4 volts at 100mA or 2.8V at 50mA. Hence, the five valves in series only required an 'A' supply of 9V at 50mA.

Now the trick was to use the output voltage from a standard full wave valve rectifier, to supply the filaments as well as the plates or 'B' supply.

The voltage at the rectifier cathode under full load is stated in Fig.2 as 115V. A large voltage dropping resistor to reduce the voltage to 9 volts would drop 106 volts at 50mA, i.e., it should be 2120Ω. However the value shown for the actual dropping resistor (R211) is 2665Ω, which computes to a voltage drop of 133 volts — which seems a more likely figure given the transformer secondary voltage.

This large resistor serves as a filter resistor. Together with C43 (25uF), it obviously provided adequate filtering.

More often than not, the voltage dropping resistor for the filaments of this type of set was adjustable, and once the valves were in position, the resistor was adjusted for the correct voltage and the adjustable tap then screwed down tightly.

The 90V 'B' supply for the valves was obtained from the rectifier in a similar manner, by virtue of resistor R210 and filter capacitor C87 (8uF). The B supply probably consumed around 15mA, so that the total load on the power supply was still only 65mA or thereabouts — well within the capability of a 6V4 rectifier.

Battery 'reactivation'

Now for the thorny aspect of these sets: their so-called 'battery reactivation' feature. This has long been a hotly debated topic; for example it occupied quite a bit of space in the late Neville Williams' column 'Let's Buy an Argument' (fore-runner to the current Forum) back in 1953. So what is battery reactivation?

Basically it was a system that was supposed to prolong the life of dry (i.e. carbon/zinc) cells. Now, is this possible? In modern times, it seems so, for articles within the last five years have appeared in the popular electronics magazines on just that topic, and construction projects have been described for dry cell chargers for both alkaline and carbon zinc cells. Ready-made units did appear up until a couple of years ago in the catalogs of the electronic retailers, and these units contained microchips and 'intelligent' circuitry.

Fig.4: What the Astor GPS looked like. Not a thing of beauty, perhaps, but it goes well — and cost the author the pricely sum of $1.00.

However in the present case we are talking 1952, and the technology was somewhat cruder. Unless the consumer was particularly vigilant, battery life was actually decreased and not increased, as was supposed to be the case.

Some extravagant claims were made by the 'National Physics Laboratory' (whoever they were), claiming that it was possible to extend the life of a dry cell by up to six times. But as Mr Williams pointed out in his Let's Buy an Argument column in *Radio & Hobbies* for October 1953: "What a lot of Hooey! There is a vast difference between technicians in white coats with stop watches and elaborate measuring equipment and a largely technically uneducated public..."

He went on. The problems were also clearly explained. A forward voltage incorrectly applied, in time, voltage or amp-hour capacity, actually *increases* the terminal voltage of the battery. What, asked Mr Williams, is 2V and 120V going to do to a set of valves designed for maximum voltages of 1.4V and 90V?

If it was going to be of any benefit, 'reactivation' had to be done quite critically. It also reduced the remaining shelf life that a battery possessed. Hence, the only possible benefit was if the battery was used, reactivated, used, reactivated, etc in a precise and continuous manner.

The trouble was that this regimen may not have always suited the owner. If reactivation was allowed to extend beyond its proper time, not only did the battery terminal voltage rise, but the batteries were cooked in the process!

Then there was the 'advice' given to potential customers by sales staff, who often didn't know a bee from a bull's foot when it came to technical matters. One can only postulate how much misinformation, either by ignorance or mischief, was presented to an unsuspecting public!

In the November 1953 issue of *Radio & Hobbies*, the month after Neville Williams had tackled the subject, a rather comprehensive response came from Mr Peter Adams, Product Engineer at battery manufacturer Ever-ready Australia Pty Ltd. Mr Adams went on to explain the correct method and realistic expectations from battery reactivation.

Firstly, the batteries had to be reactivated by passing a *reverse* current through them after a period of discharge, which should be between 120% and 180% of the amount of discharge during the preceding period of use. Next, the reactivation period should be not less than 12 hours, and is more effective with recently manufactured batteries, rather than ones with an extended shelf life. There followed much technical description of what happens to the internal chemistry of the battery, and explanations for the greater terminal voltage (1.96 volts per cell).

In summary, Mr Adams advised that if batteries underwent a period of heavy discharge — i.e., prolonged use — and reactivation was applied immediately after use (12 hours), then there was a definite increase in their useful life. He also mentioned that the precise conditions did not suit most practical conditions, and if reactivation was intermittent with long periods of non-use, there was little if any benefit, and a possible accelerated deterioration. So there we have it!

(Continued on page 73)

INFORMATION CENTRE

BY PETER PHILLIPS

Speaker power ratings, demagnetising VCR heads and reader questions

If you've ever wondered what a charge pump is, or why the least significant digit of a digital display flickers, read on. These and other questions, like demagnetising a video head (is it necessary?) are discussed this month. First up though, I describe a few modifications I did to an 'el-cheapo' portable lamp that have collectively transformed it into a much better unit.

Part of the fun of electronics is being able to build useful gadgets for little or no cost. I was recently given a combination torch-fluorescent lamp that's typical of the units you see in a supermarket. Although it had never been used, it had obviously been sitting around for some time, and when I powered it up with an external 12V source, nothing happened. I poked around to see why it wasn't working, and finally decided to rework the internals. These lamps are cheap, and you 'gets what you pays for'. But after a few hours of work, I now have a whole new lamp with a couple of interesting features.

Firstly, I decided to fit it with a 1.2Ah nicad battery pack, made up from disposal batteries from Oatley Electronics. The lamp was originally intended to work from six D cells, and I was intrigued as to how the device could work from an internal 9V source as well as a 12V external source. Simple, it had three series-connected 1A diodes between the 12V input and the rest of the circuit. However, I had discovered that the inverter for the fluorescent lamp worked better at 12V than at 9V, so I decided to go for a 12V nicad pack, and to replace the original 9V pre-focused globe with a 12V lamp of some sort. The question was, what sort?

The answer came when I visited a local lighting shop, where I bought a 12V 10W halogen light, the sort that has the lamp inside a glass covered reflector. This light fitted nicely into the reflector of the portable lamp, and takes around 800mA at 12V, giving about an hour of use from the rechargeables. The fluorescent light takes 350mA, so I reasoned this light would be for long term use (several hours), with the halogen lamp (the torch) used for short bursts. And what a light it gives!

I also had to replace the original rather flimsy switch with a wafer switch, which required a bit of re-engineering to install. I fitted a 3-position, 4-pole switch, connected as shown in Fig.1. When the switch is in the off position, an external 13V (or so) voltage source charges the nicads. Otherwise, the internal source powers either lamp.

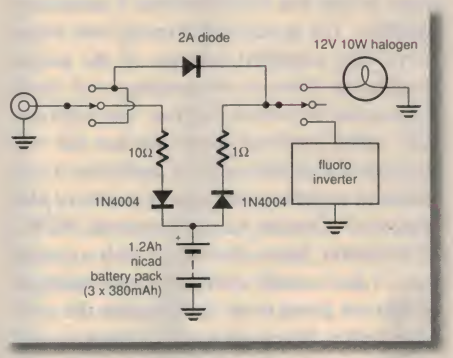
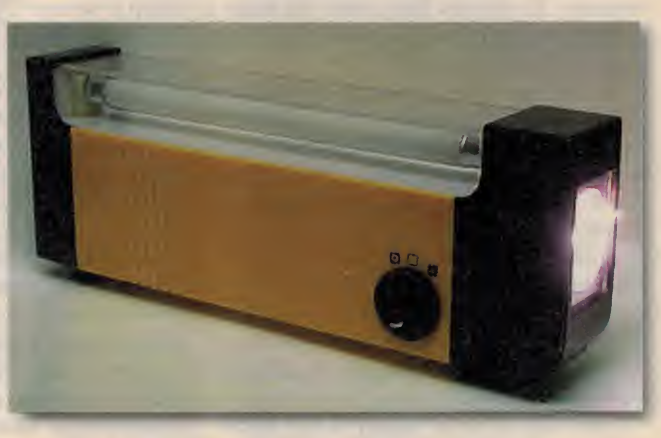


Fig.1 (above): Circuit diagram of the modified lamp.

Although not shown, the nicads are arranged as three strings in parallel, with each string comprising 10 nicads in series. So, a few hours of fun in the workshop gave me a lamp that would cost $60 or more, if such a thing were commercially available. As the photo shows, it looks as though nothing has been changed, at least until you turn it on.

Now let's turn to our letters, starting with one from a 16 year old reader, who like many others, is confused over speaker ratings.



When fitted with a 12V 10W halogen lamp, and modified as shown in Fig.1, this lamp becomes far more versatile and useful.

Computer speaker ratings

My question may seem a bit novice, but nevertheless I don't know the answer, nor do I know anyone I can ask. Many computer speakers I have seen are rated at up to 500W. Yet amplifier kits with much larger heatsinking, power supply and speakers have a similar power rating. There's a very obvious physical difference between the two, with computer speakers typically housed in a small plastic case that also contains the amplifier, with no apparent ventilation and powered from a 12V 1A power supply.

Are computer companies simply over-rating their speakers, or is there a difference in the units being used? If so, is there a formula that can be used to convert the computer speaker power rating to the amplifier power rating, and vice-versa? (Mark Evans, Floreat, WA)

Good question Mark, and I'm sure one that has confused a lot of people. There was a time when amplifier and speaker power ratings were always given in watts RMS, which is the continuous power the device can handle. So a 100W (RMS) speaker can handle a continuous power input of 100W, and would be typically driven by a power amplifier with a 100W RMS or lower output power rating.

But then someone came up with the concept of instantaneous power rating, which is

the power an amplifier can deliver (or the power a speaker can handle) for a very short time, such as 100ms or so. I'm not sure if there's a standard time for instantaneous power, but the end result is a higher number of watts, which looks good on the device's packaging or in the advertisements.

I've always regarded RMS power rating as the most reliable way to judge performance, but the marketing people have other ideas. The end result is a hodge-podge of meaningless figures that simply confuse everyone. As you say Mark, how can a tiny computer speaker have a similar power rating to a large hi-fi speaker?

An instantaneous power rating is useful as a comparison between devices only if the same duration is specified. Obviously a speaker can handle a lot more power for one microsecond than it can for one minute, and I think you'll find the ratings you are seeing are for very short durations. This is especially a problem with cheap computer speakers, which probably have an RMS power rating of less than 1W, but are given a huge instantaneous rating by the manufacturer to make them attractive to ignorant purchasers.

Converting between ratings is not really possible, so you have to rely on your common sense and look for things like the weight of a speaker, its physical size and so on. Don't be fooled by the figures — instead try and find the RMS rating. If there isn't one, you can bet it's not a very high figure.

What's a charge pump?

There are lots of strange terms in electronics, many of which are drawn from an analogy to explain the operation. For example terms like multivibrator, flywheel diode and tank circuit all mean something to those in the know, but are rather peculiar to an outsider. Our next correspondent wants the term 'charge pump' explained, and even questions whether such a circuit exists.

Is there an electrical concept called a 'charge pump' and if so, could EA publish an article explaining how it works and the theory behind it? I'm asking this question after a friend of mine got me to explain how a commercial, battery operated electric fence controller worked. I was able to do this with the aid of a sketch of the circuit and a CRO connected to the apparatus in question.

The first stage consists of a relaxation oscillator triggering an SCR in the second stage, and a switch mode oscillator driving a step-up transformer. One end of the primary winding of this transformer is tied to the 12 volt rail with the other end connected to ground through a 68V Zener diode. The switching transistor does its job by shorting out the Zener diode.

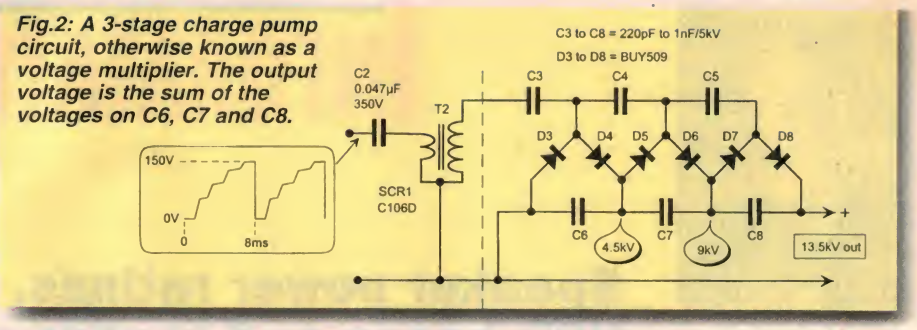


Fig.2: A 3-stage charge pump circuit, otherwise known as a voltage multiplier. The output voltage is the sum of the voltages on C6, C7 and C8.

You could clearly see, with the CRO connected between the positive of the primary winding and ground, the voltage being boosted up to around 150 volts in a cyclic manner. I was going to describe it as a 'charge pump' but refrained from doing so because I knew he would ask me how it works, and I would have to admit I didn't know.

I have seen the term charge pump used to describe the boosting up of either voltage or current in respect to time. Up until now I had always assumed it to be similar to the 'flywheel effect' in a step-up switching regulator. However, apart from the step-up transformer there was no other energy storage element in the part of the circuit under examination.

I have several very good textbooks and was disappointed when I could find no reference to charge pumps. There was a brief mention of a pump in one text that described a parametric amplifier. The article stated energy was transferred and amplified because of the unique relationship between the pumping and signal frequencies. So is there really an 'electrical animal' called a charge pump? Or has this very descriptive term been used by authors as a cop-out when explaining this type of electrical phenomenon? (Gordon Austin, Tamworth, NSW.)

Yes Gordon, there certainly is such a circuit, but it's also usually called a voltage multiplier. I'm not going to try and describe the complete action, but in principle, a charge pump circuit works by charging up the capacitors in the circuit over a number of cycles of the input voltage. The circuit in Fig.2 shows a 3-stage charge pump circuit, but there can be many more stages, as in the circuit in Fig.3.

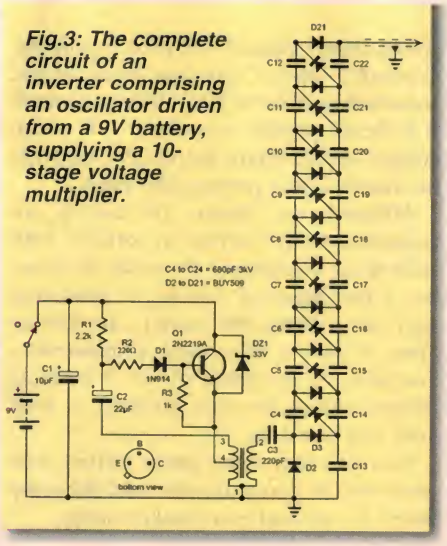


Fig.3: The complete circuit of an inverter comprising an oscillator driven from a 9V battery, supplying a 10-stage voltage multiplier.

The term 'pump' action comes from the analogy of pumping up (say) a tyre, in which it takes more than one push on the pump to fill it. In Fig.2, the output voltage is the sum of the voltages across C6, C7 and C8. Each of these capacitors is charged to 4.5kV, but it takes a few cycles of the input voltage to achieve this.

In Fig.3, there are 10 stages, with the output voltage equal to the sum of the voltages stored in C13 to C22. Obviously it will take more cycles to charge the circuit of Fig.3 than Fig.2. The voltage rating of the capacitors is therefore less than the final output voltage, but the current capability of a charge pump circuit is very limited. They are really only useful in high voltage, low current applications, such as an electric fence. The circuit in Fig.3 is from a night viewer published in October 1993.

What's a 'standard cable'?

Staying with a theme of "What's a ..?", here's a letter I'm sure I can't answer, but perhaps a reader can. But you'll need access to books from the 1800s.

Many years ago I copied out a statement which was incomplete and I thought either EA staff or readers might be able to help. The statement I copied is: "One decibel is the loss of power in a mile of standard cable at 860 cycles per second." It refers to telephony circa 1875. So, what is a 'standard cable'?

I assume the cable came off a reel and when it was strung up on poles, it became an aerial. What is its resistance per mile, and what distance was there between the aerial conductors? I would be most grateful for your help. (Old Wilbur, Dunbogan, 2443).

These days we've become rather blase about the standards used to represent measurement units. It's sometimes difficult to remember that during the last century even basic units like the ohm, volt or ampere were defined in a way that would make today's technicians cringe. So, all I can do Wilbur is include your request, and hope that a reader can help you.

Digital flicker

The next letter is from a reader who wants to know how to stop the least significant digit of a digital display from flickering.

I constructed the May '96 RF Test Oscillator some years ago, fitting it into a metal case and making a few changes to the attenuator circuit. It has worked well over the years, and has been quite useful. But over this time it has exhibited a fault that I have lived with on the basis that it's not essential to know the exact frequency as shown by the unit's digital display.

The problem is the last digit flickers all the time, jumping from say 6 to 7 and back again. I thought the oscillator might be unstable, but I noticed the display still flickered when I supplied an input signal from a crystal locked oscillator. So, thinking that perhaps the input signal might not be strong enough, I added the amplifier shown in Fig.4. Still the display flickers. What's going on?

Since I've retired (I'm now 78), my hobby is making radio sets, either to my own design or from existing designs. I generally fit a digital readout, using a module available from Circuit Electronics of London, and also from Radio Spares, but at a higher price. Unfortunately this module is no longer available, so do you know of a circuit for such a module? I need it to read frequencies from 500kHz to 30MHz, hopefully with a resolution of 1kHz. (Stewart Farrant, Yangebup, WA)

Most digital displays have this problem Stewart. It's not really a problem, instead it's a characteristic of such a display. For this reason, digital meter manufacturers usually state the accuracy of the meter as a percentage value plus or minus one digit. The reason is due to the analog to digital converter in the module, in which the least significant

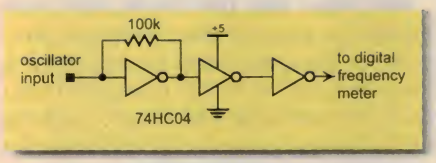


Fig.4: Input signal amplifier circuit to try and prevent digital display flicker.

bit (LSB) of its digital output switches between a 1 and a 0, depending on the value of the input voltage. You can liken this to a comparator, in which the comparator output switches randomly when the input voltage is close to the switching voltage.

Of course there are other factors as well, such as noise on the input signal, ripple on the power supply, poor earthing and other design aspects, but even when all these are OK, you'll still see the least significant display flicker to some extent. Of course, the better the quality of the digital display module, the less the flickering, but even the best of them flicker.

There is, however a small mod to fix this particular problem with the RF Test Oscillator: Disconnect the reset pin of the 4024 (pin 2 of U5) from ground, and connect it instead to pin 13 of the 74C926 (U5). This will synchronize the input divider/prescaler with the counting circuit and the display should then become much more stable.

We haven't presented a design for a frequency counter module, only complete frequency counters. Some of these are: Improved 50MHz Frequency Counter (4-digit), February 1993; 2MHz 4.5 digit Frequency Counter, August 1983; and 500MHz 7-digit Frequency Counter, February 1982.

Demagnetising VCR heads

This letter was sent The Serviceman, and I'm including it here along with The Serviceman's response, as I'm sure this a question that has occurred to many readers.

I would like to enquire about the availability of video demagnetising tools. I have looked through the McGraw-Hill book 'Troubleshooting and Repairing VCRs', I've examined a lot of other books, and have asked lots of people, but it seems no one here can help. (Mark Perry, Hobart, Tas.)

THIS MONTH'S WINNER!

Video demagnetising tools are a bit like hen's teeth: not needed even if they were available. It's a common misapprehension that video heads need demagnetising. When you consider the video signal, you'll realise that it's a high frequency, high amplitude signal, which is exactly what's needed to demagnetise video heads!

In fact, it's only necessary to demagnetise audio heads that are used for repeated playback. Each time the audio head is subjected to a recording bias, it is effectively demagnetised by the bias. For this reason, you should put an audio tape recorder into record mode for about one hour every four or five hours of use.

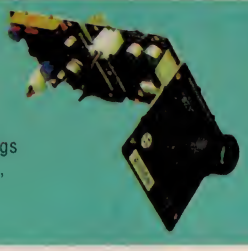
Video heads are a bit different, as the playback signal is a fully saturated FM signal on the tape, which is close enough to a high frequency sinewave that will demagnetise the head. I have never seen a video head demagnetiser, nor have I ever needed to use one.

Of course, if the VCR only ever plays tapes but never records, the linear audio and control heads behave like the heads in an audio recorder, and need occasional demagnetising. A probe type audio demagnetiser is fine for this purpose, but it should be kept well away from the video heads. As for an audio recorder, the best way to keep a VCR free of unwanted magnetism is to use the record mode one hour for every four to five hours of playback use. (The Serviceman)

Win this great Contrib of the Month Prize!

As an added incentive for readers to contribute to this column, we're now offering a valuable prize to the question judged most interesting, or the answer/response judged most informative, each month. The prize is a Mod-Col 38/54 high-res PAL colour video camera module from sponsor Allthings Sales & Services, with 450 lines of resolution, built-in digital signal processing, electronic shutter and auto gain control

— valued at over $400!



What??

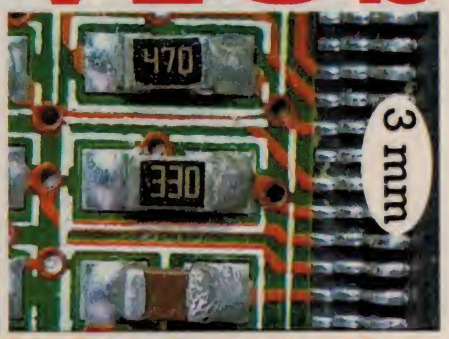
The question for this month comes from Youssuf Saad, Merrylands, NSW. Youssuf suggests you first try estimating the answer before calculating it, as the answer might shock many people.

You have a very large sheet of paper. You cut the sheet in half and place one half on top of the other. You then cut the two sheets in half and stack them on top of each other. You repeat the above process of 'cut and stack' another 48 times, giving a total of 50 cuts and stacks. Assuming the paper is 0.1mm thick, how high will the stack of paper be after the 50th cut and stack?

Answer to September

There are two answers: 2A and 2.5A. These answers can be verified with Ohm's law by working backwards from a known load voltage. If you assume two separate cases for the load voltage, one at 4V and the other at 5V, then the currents will be 2A and 2.5A, but the supply voltage works out to be 9V in both cases. It was solved with a simple spreadsheet that calculated the supply voltage based on a load voltage that varied from 1V to 10V, and the 9V supply pops out for both 4V and 5V load voltages.❖

VICS



Video Inspection Capture System
Surface Mount Re-Work
VCR Head exam.
Image Capture
Create AV CD & www
Update Files
www.allthings.com.au/vi

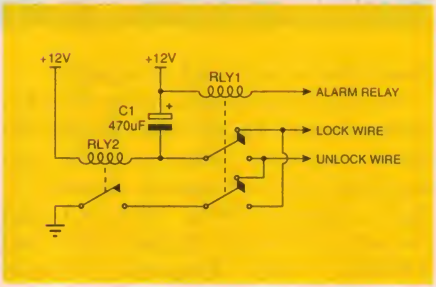
Circuit & Design Ideas

Interesting original circuit ideas and design tips from readers. While this material has been checked as far as possible for feasibility, the circuits have not been built and tested by us. We therefore cannot accept responsibility, enter into correspondence or provide any further information.

Remote alarm to central-locking interface

After adding an after-market accessory central door locking kit in my car I wanted to have the convenience of remote control central locking, without interfering with its manual operation. The central door locking kit I used was from Dick Smith Electronics, although many are similar — Jaycar, Strathfields, etc.

This circuit acts an interface between a remote control alarm already installed in the car and the central locking, and suits older alarms or immobilisers that don't have central locking control outputs, but have an ignition kill relay output — as most do. I found that the alarm I was dealing with had a relay output that acts as a sink (goes to GND) when the alarm/immobiliser is armed from the remote. But this output can't simply be connected to the central locking controller as it 'sticks' in either position, preventing manual lock operation.



The circuit works by giving a short grounding pulse to the controller's lock or unlock control wires when the alarm is armed or disarmed, respectively. It relies on the fact that the lock actuator grounds the control wire corresponding to its current state, and this changes over to the other wire when the lock mechanism has moved. The schematic shows the system in the alarm off, unlocked state (all relays off), so the UNLOCK control wire is at ground.

When RLY1 is activated by arming the alarm, RLY2 is held on for a short period until the UNLOCK control wire is no longer grounded (that is, the locks have moved). During this time RLY2 briefly grounds the LOCK control wire, which activates the door locks. As the LOCK wire is now grounded by the actuator, the system will unlock in the same way when RLY1 disengages as the alarm/immobiliser is turned off. The capacitor ensures that RLY2 stays on long enough for the locking system to be triggered properly.

David O'Conner
North Adelaide, SA **$25**

THIS MONTH'S WINNER!

Illuminated button and turn-off delay for the Designer Door Alert

This circuit was inspired by the $10 Wonders Designer Door Alert in the September '98 issue, but adds a latching feature so that once the door button is pressed, the alarm will continue to sound for a pre-determined period. It also provides illumination for the button by a pair of LEDs. This last feature makes it unsuitable for operation from dry cells, and it's intended to be operated from a mains powered supply or a SLA battery on float charge for a burglar alarm etc.

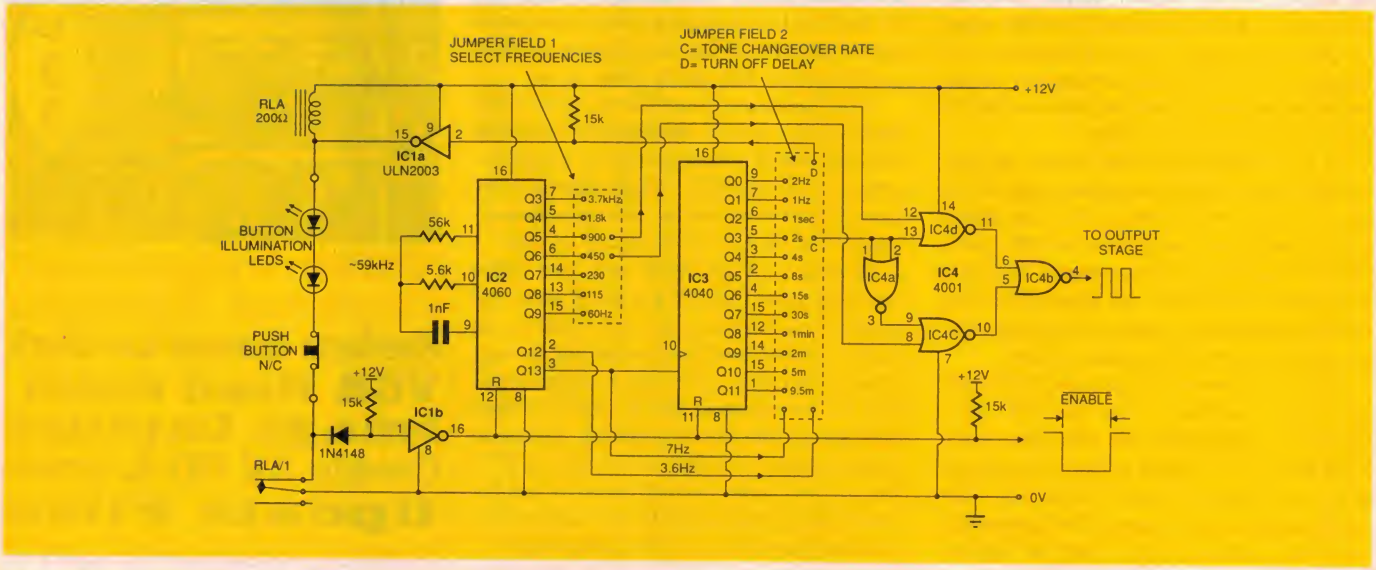
Assume that relay RLA is operated and held by its own contact RLA/1, where the relay coil current flows via the button illumination LEDs and the normally-closed push button. RLA/1 also holds the input of IC1b low, which results in a permanent reset applied to the counters IC2 & IC3.

When the button is pressed the holding circuit of RLA is broken and contacts RLA/1 change over. The input of IC1b is then pulled high, removing the reset from the counters and the alarm sounds. Releasing the button has no effect, and eventually the counter output which is connected to terminal D will go high, causing IC1a to operate RLA which locks up via its own contact as before.

The use of the relay to perform the latching function eliminates false triggering by radio transmitters, cosmic rays or other unexplained events and, since we have to provide current for the LEDs, this current can hold the relay operated for 'free'. Note that there will be about 2V across each LED leaving only 8V for the relay, which must be chosen to suit this voltage.

Note also that the circuit will cycle through its alarm-on state when first powered up. The push-button recommended is from DSE, cat No. P7554. It has SPDT contacts and room for the LEDs inside, while the unused normally-open contact can be used as a mounting point for the LEDs.

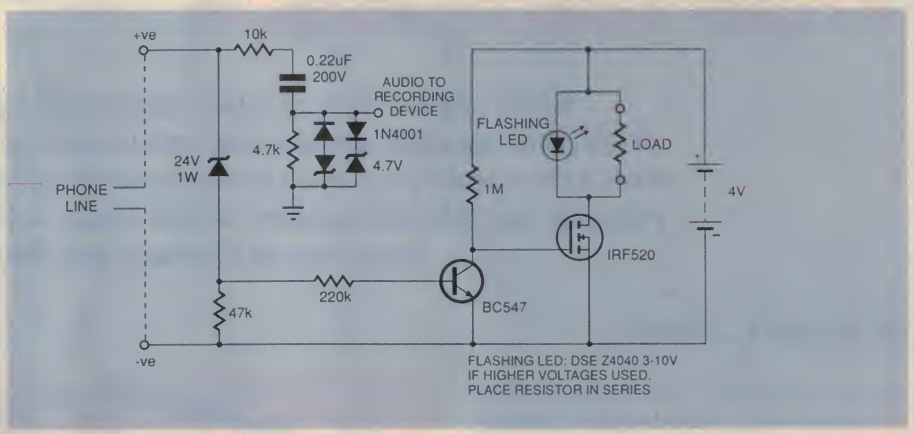
Graham Leadbeater
Ringwood, Vic **35**



As an added incentive for readers to contribute interesting ideas to this column, the idea we judge most interesting each month now wins its contributor an exciting prize, in addition to the usual fee. The prize is an open order to the value of $300 from Oatley Electronics! Yes, that's $300 to spend on anything you want from Oatley's wide range of products, so check out their ad (or their Website) to see what's on offer.

Win our 'IDEA OF THE MONTH' Prize!

Phone recording device switch



This circuit detects when the telephone receiver is lifted off the hook, then switches power to an external load. When a telephone is lifted off the hook the nominal voltage on the phone line drops from approximately 50 volts to about 6 volts, so the 24V zener diode will cease to conduct, thereby switching the BC547 transistor off. This allows the voltage at the MOSFET's gate to rise, which turns it hard on switching power to the load.

The voltage on the MOSFET will depend on the type of load, but in my application where a small portable cassette recorder is switched via its remote socket, this was about four volts. The flashing LED indicates when the MOSFET is on, and gives a relative indication of the power source voltage — important if you are using batteries.

When assembling the unit, note that you must identify the positive and negative lines when connecting to the phone line. A bridge rectifier incorporated into the circuit would overcome any polarity problems when used on other telephone lines, but the audio must be taken off before the rectifier. If the circuit is used as a telephone bell extender the audio take-off section is not needed, and the MOSFET can be used to drive either a high-powered noisemaker or an incandescent light.

If used to switch on an appliance such as an audio recorder, the operation is silent and does not produce any audible clicks on the phone line. As the recorder will be activated when the phone receiver is lifted, the outgoing touch tones will also be recorded.

Of course, it should be noted that Telstra does not permit the connection of non-approved circuits to their telephone system, and this circuit should only be used on private telephone networks that are not connected to the Telstra lines.

Phillip Seeley
Sandringham, NSW **$30**

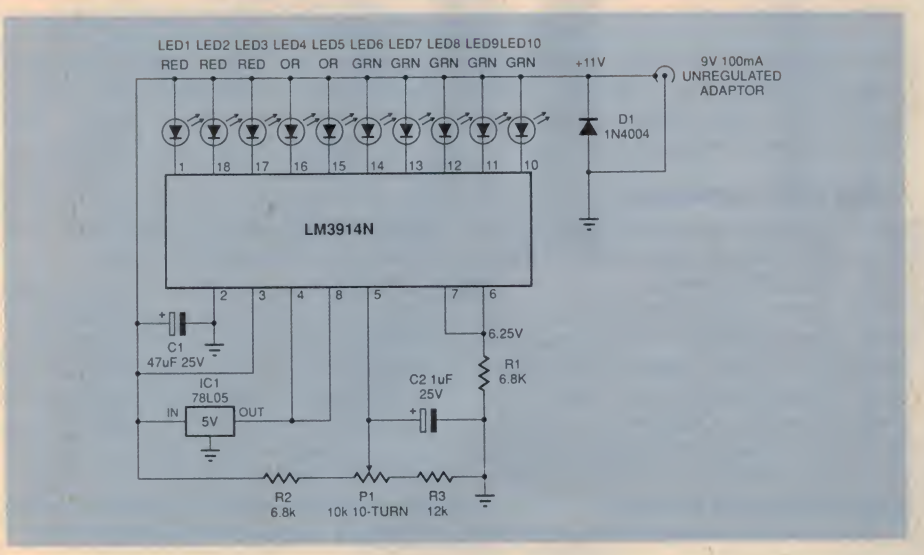
LED mains monitor

Mains power is subject to constant movements in voltage due to variations in load on a given circuit and local consumer demand. To see if it falls below the level for some equipment to operate correctly you could connect a DMM permanently to a power outlet, but this is not very practical or safe. This design is entirely safe, can be easily read in the dark and responds instantly to dips in voltage. Here, a nine volt plug-pack powers an expanded scale LED meter monitoring its own supply.

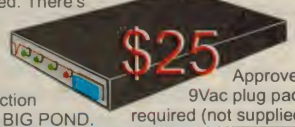
The LM3914 display IC is used in dot mode for a constant current draw, and is configured so each LED represents a five volt increment when referred to the mains. Readings are related to peak voltage, which suits electronic devices.

Ten LEDs read from 200 to 250 volts with red indicating low voltage, orange marginal and green the range that most equipment will tolerate. Voltages below 200 will show no reading, while the last LED stays on above 250 volts. To calibrate, set the trim pot (P1) so the LEDs match with DMM readings. The design may also prove useful where a generator or DC inverter provides the power.

Phil Allison
Summer Hill, NSW **$35** ❖



MODEM MADNESS
Why buy a fast modem when it is rare to log on at the maximum speed. There's 28.8 modems come with a free CD rom / free 30 hour internet connection TELSTRA's to BIG POND.



$25
Approved 9Vac plug pack required (not supplied)

NEW FULLY FEATURED ANSWERING MACHINES.
Brand new in original box with manual, tape, plug pack and phone lead Call screening, up to 2.5 min. out going message, VOX recording, power fail protection, memo record, plays music before beep, digital volume control, programable security code, remote call breakthrough, room monitor, full remote features, save old messages, AUSTEL approved. Bargain priced to clear at $25

$25
FOR MORE SEE OUR OTHER AD IN THIS ISSUE.

To see our huge range of kits and bargains on our web site
oatleyelectronics.com
1_9OCT_99

Construction Project

Compact Video Title Generator

Here's another easy to build project based on the versatile ST Microelectronics STV5730A video text overlay chip. This time it's a very compact video title generator, which uses a readily available IBM-compatible 'AT' computer keyboard to place clearly-readable text virtually anywhere on the image — with adjustable zoom levels, blinking and so on. All for much less than you'd pay for a commercial titler...

BY DAVID L. JONES

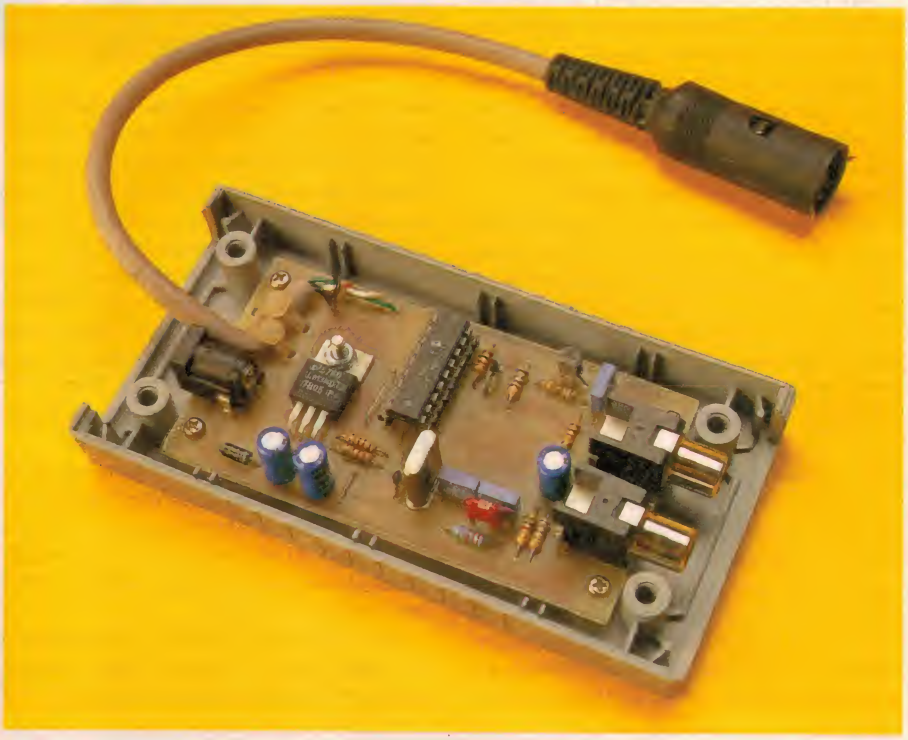
LAST MONTH, we presented the designs for a video time-date generator and a PC-based video text display generator, both of which were essentially based on the same chip and circuit but designed for different applications. However it was felt that there was also a need for a dedicated video title generator (VTG) that did not require a cumbersome PC to control it. It would also be nice if it was low cost, compact and housed in a nice case...

Well — you guessed it, the design to be presented here fulfills these requirements and more. As a bonus it uses a standard IBM AT keyboard, which can now be obtained for as little as $10 or less brand new at local computer markets. The keyboard connects directly into the device, eliminating the need for a separate computer, and all on-screen editing is done directly through the keyboard.

You can display a maximum of 11 rows of 27 characters, along with controlling various attributes such as blinking, character borders, and four different font sizes.

The unit is housed in the same size elegant looking compact moulded case as used by the video time-date generator described last month.

So this new design is ideal for adding smart looking titles to your home movies, as well as countless other applications where text needs to be added to a video signal.



Circuit overview

If you compare the circuit with last month's time-date project, then you will see that they are identical in most respects. The only differences being that this design lacks the time/date chip, pushbutton switches and battery, and needs a bigger voltage regulator to power the IBM keyboard. Apart from that, they are both based on the same PIC microcontroller and share identical analog sections based around the STV5730A chip. In fact, the two share almost exactly the same PCB layout for the left hand half of the board.

The operation of the video section based around the STV5730A is the same as last month, but we will repeat the circuit description here again for convenience.

STV5730A operation

The basic internal operation of IC1 is shown in the accompanying block diagram (Fig.1), while the full schematic for the titler is shown in Fig.2. The composite video input (from your camcorder, VCR etc) is first terminated by R4 into 75ohms and AC coupled by C5 directly into IC1. This signal is then clamped and the composite sync signal is extracted. The input AC coupling and clamp are required in order for IC1 to able to operate off a single +5V DC supply.

The extracted sync signal controls the timing of the vertical sync generator, along with the external crystal. This crystal must be 17.734MHz for PAL signals and 14.318MHz for NTSC (i.e., four times the colour subcarrier frequency, in each case). These timing signals are then fed into the horizontal and vertical scanning logic, which drives the RAM address generator.

The RAM address generator selects a character to be displayed from the internal user definable character RAM, which points to a character in the character generator ROM. This ROM data then controls the luma and sync generation section (YOUT) which feeds the sync insertion and text insertion logic (via YIN). The final video signal with the text overlay emerges from the text insertion section and is buffered and passed to the video output.

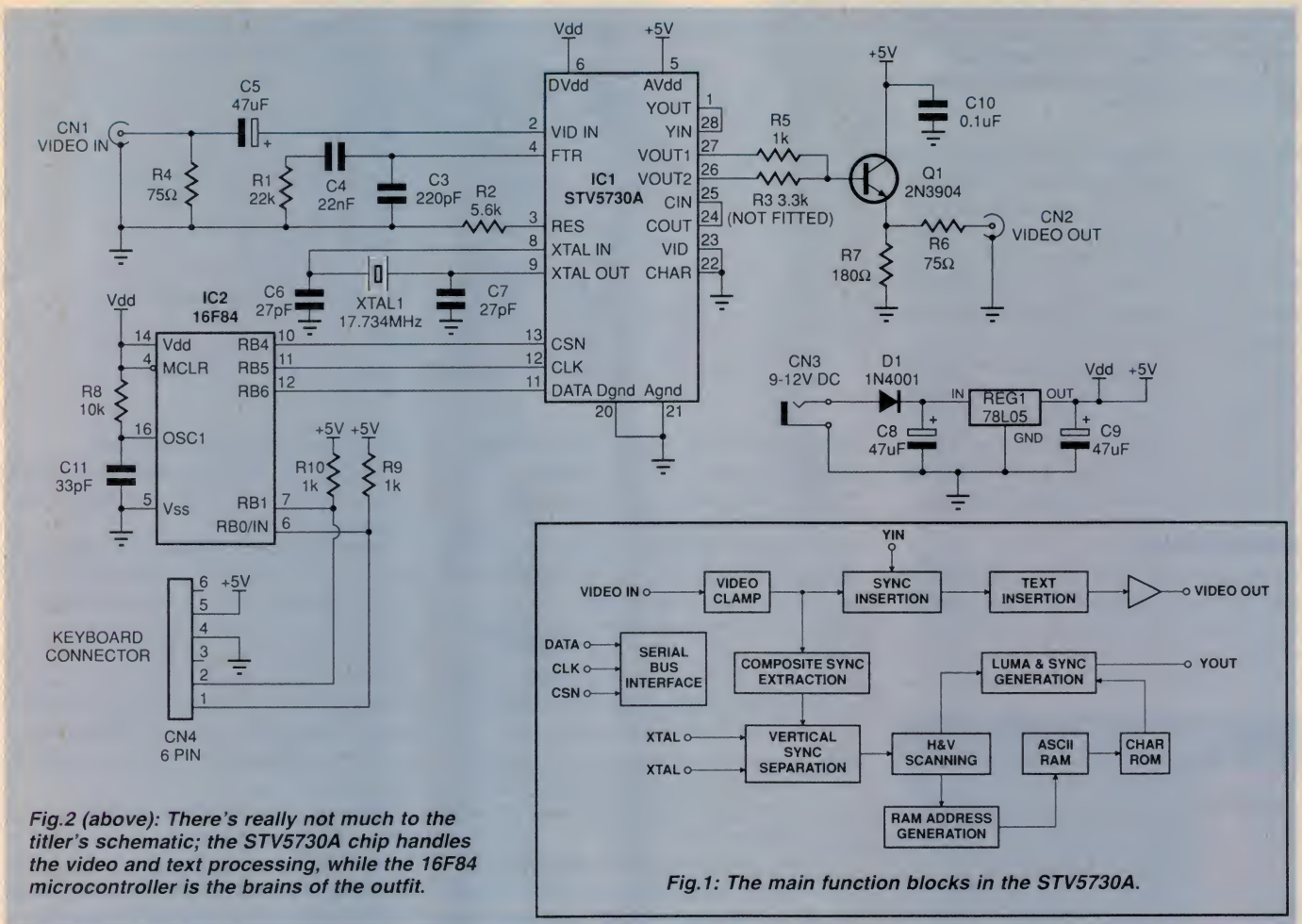


Fig.2 (above): There's really not much to the titler's schematic; the STV5730A chip handles the video and text processing, while the 16F84 microcontroller is the brains of the outfit.

Fig.1: The main function blocks in the STV5730A.

Outside the chip, the video output is then fed into the emitter follower circuit of Q1, which drives the 75ohm output.

Because the output is 75ohm impedance (via R6), if the internal gain of IC1 was set to 0dB then the output would be 6dB down when terminated into a 75ohm load. To allow for this attenuation the internal gain of IC1 is set to +6dB by the software in IC2, when the circuit is first powered up.

The network of R1, C4 and C3 is used for IC1's internal PLL loop.

The character brightness can be controlled via an external voltage or generated internally. In this application the brightness is controlled internally and is set to approximately 75% of the white level, which is auto sensed by the internal circuitry.

The chip has an analog signal bandwidth of 8MHz and is more than capable of passing high quality PAL or NTSC colour or monochrome signals.

As you can see, the STV5730A is quite a clever chip!

IC1 requires separate analog and digital supply and ground lines and as you will see on the PCB these have been kept separate to reduce coupling of noise from the digital supply into the analog section.

Circuit operation

As with last month's Clock/Message Generator project, the chip used to control the STV5730 is again a PIC16C558 8-bit RISC microcontroller (IC2). This has 2KB of one-time programmable instruction memory, 128 bytes of RAM, 13 bi-directional I/O lines, and can operate at up to 20MHz. The total code for the firmware is just under 1KB, so the PIC16F84 and PIC16C61 chips could also be used.

IC2 uses an RC clock oscillator with timing set by R8 and C11, running at approximately 3MHz. There are no critical timing loops involved in the software, so an RC oscillator is cheaper than a crystal.

The controller uses five I/O lines to control everything — three for the I²C bus interface to IC1, and two for the interface to the AT keyboard.

When power is first applied the firmware resets and initialises various modes in IC1, displays the intro help screen, and then sits in a main loop processing actions from the keyboard. The software continues in this loop indefinitely and only updates the screen when an appropriate keyboard action is detected.

The IBM AT keyboard is based around a two wire open collector bidirectional data system. There are two lines, CLK and DATA. The host device which is usually a PC, but in this case our PIC microcontroller IC2 can both send to and receive data from the keyboard. The host can send commands to turn the LED's on or off, set the typematic rate, initialise the keyboard, along with various other things. However in this application IC2 only receives data from the keyboard.

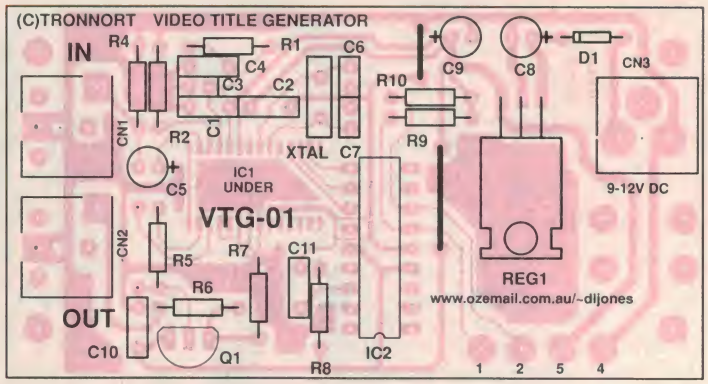
In this mode when a key is pressed the keyboard will generate a clock signal on the CLK line at approximately 30kHz, and will output synchronous serial data on the DATA line the value of which depends on which key is pressed. Some keys only generate a single data byte, or 'Scan Code', while others can generate two, four, or even eight bytes for a single key press. When the key is released yet another scan code is sent, along with the code for that key.

In this case the firmware in IC2 ignores all key release codes and only acts apon initial key presses.

Every scan code is also sent with a start bit, stop bit, and a parity bit. The parity bit is not checked in this case, as there would be very little chance of data corruption.

The firmware reads each scan code and compares it with an internal lookup table that determines which key has been pressed. It

Follow this overlay diagram when putting the titler together - take particular care with the orientation of any polarised components, such as electrolytic caps and semiconductors.



then works essentially as a rudimentary word processor, interpreting keypresses, moving the cursor around the screen and editing the text.

The 16F84 processor also has a watchdog timer, which will reset the processor if the software 'locks up' and does not receive the watchdog reset command contained within the main loop.

REG1 is a common 7805 three-terminal linear +5V voltage regulator. The circuit will take less than 50mA, but the AT keyboard can take anywhere up to 300mA, with about 100mA being the typical figure. Thus the regulator can be used without a heatsink.

Construction

As you can see from the photos, the circuit is built on a single compact PCB measuring 88 x 48mm, which is housed directly into a compact moulded enclosure measuring 120 x 60 x 30mm. The only component not mounted on the PCB is the 5-way DIN keyboard connector, which is mounted on the end of a short piece of multiway cable.

The PCB mounts directly into the case on four moulded PCB mounts. Overall it's a simple yet elegant solution that provides the utmost of ease in construction.

Start assembly of the PCB by inspecting the board for shorts and other problems — although all PCB's supplied should be solder masked, so this will generally not be a problem.

You should start with IC1 first, the most difficult component to mount, as it is harder to solder once all the other components are in place. Be sure to take all the usual anti-static precautions first, though.

IC1 is a 28-pin SO surface mount IC package, mounted on the solder side of the PCB. If you haven't done any surface mount soldering before, then this will be a new challenge. You will need a fine-tipped temperature controlled soldering iron and 0.56mm or finer solder. You can get away with 0.71mm solder, but the finer solder produces a much better result.

Soldering surface mount IC's is relatively easy if you follow a few simple rules. First of all locate pin 1 on the PCB (it will be marked with a small '1'). Apply some solder to this pad to form a small 'bump'; this is to aid in holding the chip in place. Now locate pin 1 on the chip and align it with the pretinned pin 1 pad on the PCB, before applying the tip of the iron. The chip lead should sink down onto the pad and hold the chip in place.

Ensure that the chip is centred on the other pads; if not then briefly re-heat pin 1 and gently move the chip until it's centred. You can now solder the other pads — starting with pin 15, which will hold the other corner of the chip in place. This is done like soldering a normal joint except that you will apply far less solder.

Unless you are experienced, do not solder all of the pins one after the other as the chip may get overly hot and possibly get damaged. After every few pins stop and feel the chip; if it is too hot to touch then let it cool down before continuing — there's no rush. One of the major causes of surface mount component failure is excess heat, so be careful!

Do one final check to ensure that there are no solder bridges between pins. Use a magnifying glass if needed.

Due to the small number of components, the mounting order of the other components is not important, but it is recommended to leave the high profile components such as the RCA connectors until last. An IC socket should be used for IC2 as this chip contains firmware and thus may be updated at a later stage. Ensure the correct orientation of polarised components. Use the component overlay as a guide.

The regulator should be secured to the PCB with a nut and bolt, but be sure to bolt it to the PCB before soldering it, as doing so after soldering can strain and crack the joints.

The flying lead for the DIN connector is soldered directly onto the PCB and held in place with two small cable ties, mounted though holes in the PCB.

At this stage your PCB should be finished, but don't mount it into the case until it has been fully tested.

Testing & operation

As with last month's project there is again essentially no testing or setup to be done; the project should work first time.

Connect a video source to the input (camera, VCR, video generator etc) and a monitor (VCR, security monitor, TV etc) to the output. Apply a 9V to 15V DC power source (centre positive) to the board and you should immediately see the main help screen on the display. This screen shows the various editing commands that are available.

Pressing ESC should clear the screen and present you with a row cursor in the top left corner, which indicates which row you are currently on. There is no actual character display cursor. Typing the usual letters or numbers will cause them to be displayed on the screen on the current row, and the Backspace key can be used to erase the last character. Only upper case characters are allowed, by the way.

You can move from row to row using the

Parts list

Semiconductors

IC1	STV5730A on-screen display chip (SO-28)
IC2	Programmed PIC 16F84 (Tronnort)*
REG1	7805 5V regulator
D1	1N4001 diode
Q1	2N3904 NPN transistor

Resistors

All 0.25W:

R1	22k
R2	5.6k
R4,6	75 ohms
R5,9,10	1k
R7	180 ohms
R8	10k

Capacitors

C1,2,10	0.1uF MKT
C3	220pF ceramic
C4	22nF MKT
C5,8,9	47uF 16VW RB electro
C6,7	27pF NPO ceramic
C11	470pF ceramic

Miscellaneous

1	PCB, 88 x 48mm, code VTG20
1	Plastic utility case, 120 x 60 x 30mm
1	17.734MHz crystal, HC-49 package
2	RCA connector, PCB mount 90°
1	2.1mm DC power connector, PCB mount
1	5-pin DIN socket (180°), cord type with shell

2 nylon cable ties, small; short length of four-wire data cable; 3mm x 10mm machine screw with nut and star lockwasher.

***NOTE: PIC 16F84 chips programmed with the author's Video Titler firmware are available for $20 from Tronnort Technology, of 12 Copeland Road, Lethbridge Park 2770; or contact him by e-mail (dljones@ozemail.com.au).**

up and down arrow keys on the numeric keypad (not the usual T-shaped arrow keys), but when you move to another row you cannot go back and edit an existing row. If you start typing on a row that already has text on it then that row will be erased and the first character typed will be displayed. This is due to memory constraints in the microcontroller; it only has enough RAM to store the current line of text. Once you move to another line that data disappears from memory, but is still updated on the screen by IC1.

There appears to be no strict standard for the clock speeds of PC keyboards and the firmware does its best to cater for all available. But there may be times on certain brand keyboards when keys are pressed too fast and the firmware gets caught in a state where it may not detect all key presses. In this case it will usually correct itself within a few key presses.

Depending on your type of video signal, you may need to adjust the horizontal and vertical position of the text display, which can be done with the F5 through F8 keys. This data is not saved when the power is disconnected so it will have to be adjusted each time if needed.

The F2 key will toggle the character borders on and off, which is a black border around all of the characters to help with legibility when viewed on certain video images.

F3 will toggle the row cursor on and off, which is useful when you just want the text to be displayed.

F4 will toggle character blinking off and on, but you must clear the screen directly after using this command for it to take proper effect.

F9 and F10 will zoom the text in the horizontal and vertical directions respectively. There are 4 levels of zoom in both directions, which cycle though back to the smallest font size. Please note that the firmware does not calculate how much text can fit onto the screen with any given size font, so it will always allow you to edit the maximum of 11 rows by 27 characters even if it cannot display them.

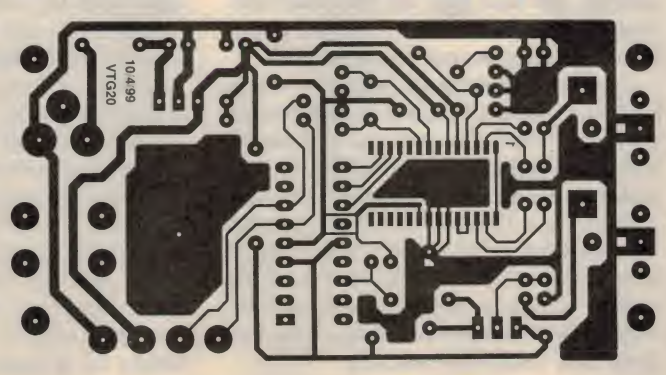
ESC will clear the current screen but retain all attributes, while F1 will call up the help screen and effectively reset the software and restore all attributes to default.

So with careful use of the editing functions you should be able to place text anywhere on the screen in four different sizes.

A complete kit with all components including the programmed PIC chip will be available, as well as individual programmed PIC chips and video chips for those who wish to build their own unit.

Further information is available from the author's web site at **www.ozemail.com.au/~dljones**, or by e-mail to **dljones@ozemail.com.au.**

Happy video titling! ❖



Here's the PCB artwork reproduced actual size, so you can etch your own. Note that commercial copyright is held by the author, and boards may only be available from a nominated kit supplier.

Robotics
DIY KITS
"5 axis arm"
check web site for more info
Range of programmable arms, walkers and mobiles
www.robotoz.com.au
Ph: (61 8) 9246-1573 Fax: (61 8) 9246-1563

SatBeeper.
In-line satellite TV dish alignment instrument. Peaking a dish has never been simpler as SatBeeper indicates signal strength by varying audio tone pitch. No adjustment is required.
SATBEEPER
12 Kitson St.Frankston VIC 3199, also Sydney, Ulverstone & Woolgoolga
Tel:(03)9783 2388
Fax:(03)9783 5767
placey@netlink.com.au
Lacey's Australia
Trade Catalogue avail.

GCE Gold Coast Electronics
Subwoofer design and sale our specialty.
From $375
Jaycar ELECTRONICS
AUTHORISED DEALER
2474 Gold Coast H'Way
Mermaid Beach
(07) 55260955

Construction Project

Fan Cooled 250W 4/6/8 ohm Dummy Load

If you're involved in testing audio amplifiers, here's a little project that should interest you. It's a compact fan-cooled dummy load that uses readily available and relatively low cost parts, yet can be switched to provide any of three commonly needed load impedances (4, 6 or 8 ohms), with power ratings varying from 125 to 250 watts.

BY JIM ROWE

IT'S NOT SOMETHING that's needed by everyone, or even every electronics enthusiast in their home workshop. But if you ever need to check out the performance of an audio amplifier, a resistive dummy load can be a very handy tool. Even for basic troubleshooting it's a lot easier on the ears (and those of your colleagues or family) to have the amplifier driving a dummy load rather than speakers. And of course for accurate testing of aspects such as frequency performance, power output, signal to noise ratio etc., the 'flat' performance of a resistive dummy load is virtually essential — even the best speakers tend to have 'peaks and troughs' in their impedance curve, which can distort your measurements.

In any case you wouldn't want to have speakers connected to a modern amplifier undergoing power output tests; even if the speakers *could* cope with the continuous power output without damage, the resulting sound levels would be deafening!

So for anyone testing audio amplifiers, a dummy load can be very handy and sometimes essential. But why describe one now? Well, the simple explanation is because I needed a second one for my home lab, to augment one I built a while back and allow more convenient testing of higher-powered modern stereo amplifiers. And commercial dummy loads are both scarce and fairly expensive, so the only practical way to acquire one tends to be by 'building it yourself'.

We have described a few dummy loads in the past, of course. Quite a fancy fan-cooled stereo design was described in the April 1984 issue, for example. The prototype of that unit is still in use in the *EA* lab, but like other designs it used fairly hard to get — and quite expensive — high power resistors in finned metal packages.

I soon realised, while I was in the planning stage, that if I wanted to build a new dummy load of reasonable power rating it would really need to use readily available and relatively low cost resistors. From a study of the main catalogs this tended to narrow the field down to one basic type: the 5W-rated wirewound size, cemented into a ceramic casing about 10mm square and 22mm long.

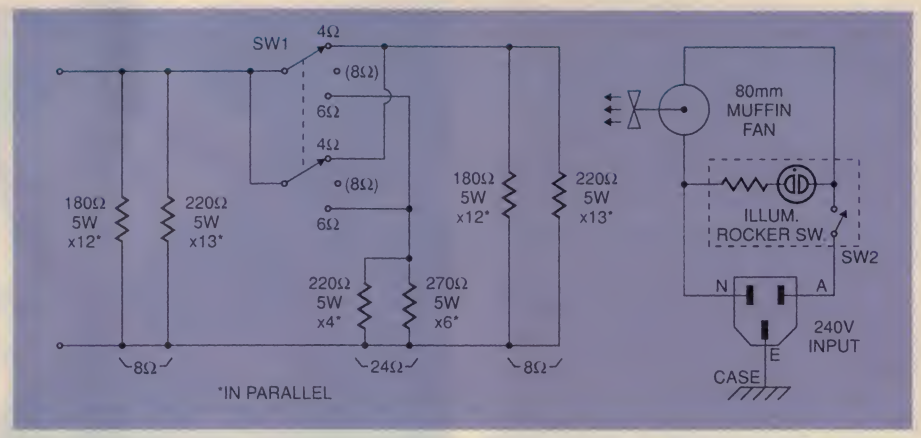
To make the dummy load useful for testing modern amplifiers, I decided that it needed to provide a choice of at least two load impedances (8Ω and 4Ω), and preferably 6Ω as well. It also needed to cope with power levels comfortably above 100 watts for the 8Ω load, and somewhat higher for the two lower impedances. So there was no doubt that I would be looking at quite a number of 5W resistors, very likely assisted by fan cooling — and with some fairly heavy-duty switching.

This was the challenge, then: to come up with a design which would achieve the desired impedance levels and power handling capability, with the minimum cost and complexity — and preferably with it all fitting into a fairly small and low-cost box...

I think I've been reasonably successful in meeting these goals. As you can see from the photos, everything fits in a readily available and low cost aluminium utility box measuring 150 x 130 x 100mm. The load circuitry itself uses exactly 60 of the 5W wirewound resistors, which will typically cost you only $30 — much less than if fancy higher-power resistors had been used.

A small (80mm) computer-type 'muffin' cooling fan is used to help the resistors cope

As you can see, the circuit is really very simple. A heavy-duty toggle switch is used to select the three load impedance levels.



with dissipating high powers, and although this adds a further $30 to the overall cost, I believe it's a good investment.

The load does allow a choice of three impedance levels, 8Ω, 6Ω and 4Ω), which should make it suitable for testing most modern amplifiers. And by deliberately being a bit wasteful with the resistors, I have been able to keep the switching very simple; only one DPDT centre-off toggle switch is used, with the two sections connected in parallel. As the switch is rated at 6A per section, this means that it should handle up to 12A quite reliably — and as it only handles a maximum of half the load current, this means that the switch will be working well within its rating even when the load resistors themselves are running at full capacity.

Although the 60 resistors making up the load are not all used at once, for any of the three impedance settings, and they *are* all mounted in a fairly compact array, the cooling fan helps maintain their dissipation capability. As a result I believe a reasonably conservative overall power rating for the load is 125W for the 8Ω setting, 150W for the 6Ω and 250W for the 4Ω setting.

I've tested the prototype unit at these power levels for periods of five minutes at a time, with no obvious damage. This should be sufficient for most normal testing, as you can leave the fan going to help the resistors cool down between tests.

This order of performance seems reasonable for a dummy load that should cost you less than $105, I hope you'll agree.

Circuit details

As you can see from the schematic, the circuit is very simple and straightforward. The load resistors are connected in three parallel groups, with two groups of 25 forming what are nominally 8Ω 125W resistances, and a further group of 10 forming a nominal resistance of 24Ω with a rating of 50W. One of the 8Ω groups is connected permanently across the input terminals, and forms the basic 8Ω load, while the other two groups are switched in parallel with this main 8Ω by SW1 when needed, to provide either the 6Ω or 4Ω load impedances.

Each nominal 8Ω group is made up from 13 x 220Ω resistors and 12 x 180Ω resistors, giving a calculated resistance of 7.95Ω (i.e., 0.6% low). The nominal 24Ω group is made up of six 270Ω and four 220Ω resistors, giving a calculated value of 24.75Ω (about 3% high).

Note, however, that these calculated figures don't make any allowance for the fact that the 5W resistors being used normally only have a 10% tolerance anyway. So the accuracy of the actual impedance levels provided by the final dummy load is determined mainly by the within-tolerance variations of the actual resistors you use. Those used in the prototype actually turned out to give figures somewhat better than you'd expect: 8.02Ω for the 8Ω setting, 6.073Ω for the 6Ω setting and 4.02Ω for the 4Ω setting.

The cooling fan has a 240V motor, and as a result the fan circuit is extremely simple: just an IEC mains inlet connector and an illuminated rocker switch to control the fan operation and indicate when it's functioning.

Construction

As you can hopefully see from the internal photos, the construction of the dummy load is not unduly complicated. The trickiest part is assembling the array of resistors, as you might imagine. We'll cover that in a moment.

The cooling fan is mounted inside the left-hand end of the case, with the IEC mains input connector just below it and the rocker switch at the lower left-hand corner of the front panel, to keep the mains wiring all in a small area and as far as possible from the actual load wiring.

The load resistor assembly is mounted behind the upper centre area of the front panel, spaced 20mm back from it via insulated pillars so that the resistor array is located broadly on the fan axis for most efficient cooling. An array of 8mm holes cut in the right-hand end of the case provides an exit for the cooling air, also aligned with the fan axis.

The impedance selector switch is located at the bottom centre of the front panel, just below the resistor array, while the connection terminals are at the bottom right-hand of the front panel. It all works out relatively neatly.

As mentioned, though, the only tricky part is assembling the array of 60 resistors. These are supported between two rectangles of 'prototype' stripboard, of the type having both the strips and holes pitched on 0.1" centres. The two boards need to be 98mm long by 88mm wide; for the protoype I cut each from a standard 88 x 153mm piece (DSE cat number H-5612 or similar).

The resistors are basically fitted on the centres of an 8 x 8 array between the two boards, but with the positions in each 'corner' of the array left free for the 3mm holes used to mount the array on the tapped mounting pillars. The resistor columns are aligned with every fourth copper strip, and the rows on every fifth row of holes in the strips. This spaces the resistors about 1mm apart in the rows, with the rows themselves spaced about 3.5mm apart — which allows for a reasonable flow of cooling air through the 'aisles' between the rows.

To further assist in cooling the resistors, they are deliberately mounted between the two boards with about 18mm of lead length clear at each end. That is, the boards are spaced about 58mm apart. This allows plenty of air flow around the leads, which are almost certainly the lowest thermal resistance path for heat energy exiting from the resistors. As you can see from the photos it isn't beautiful, but it works...

Assembly

The easiest way to assemble the project is to make up the resistor array first. Then you can cut the various holes in the box and mount everything other than the array; this gives you room to fit all of the mains wiring and correctly sleeve all of the joints with heatshrink, etc. You can also fit the heavy wiring between the load terminals and the selector switch, before finally adding the resistor array to complete the job.

To make up the resistor array I first cut the two stripboard panels to length, and drilled the four 3mm mounting holes in the corners of the board that would become the 'bottom' side of the array. Then with a fine-point marker pen I marked out both boards with the row and column locations, and finally enlarged the holes in each intersection with a 1mm drill so that the resistor leads would pass through them easily.

I fitted the mounting pillars to the lower board at this stage, because it's easier to do this before any resistors are fitted. The pillars go on the copper side...

Next, I straightened the leads on both ends of all 60 resistors, so they were not only straight but also nicely aligned with the component's axis. Then I proceeded to fit the various resistors to the lower board row by row, using a piece of cardboard 18mm wide and 100mm long as a spacer to ensure that the bodies of each row were all the correct distance from the board.

Which resistors go in each row? I suggest you use the diagram of Fig.2 as a guide, to make it easier — both to fit the resistors and to make the connections for each group later.

I found that I could hold two resistors in position at the same time while their ends were soldered to the board copper, which speeded things up a little. (It's still a fairly tedious operation, though — you need patience.)

By the way, I left all of the excess lead wires untrimmed at this stage — some of them can be trimmed off later, but others can be bent over and twisted together before soldering at the twists, to make the links between various columns.

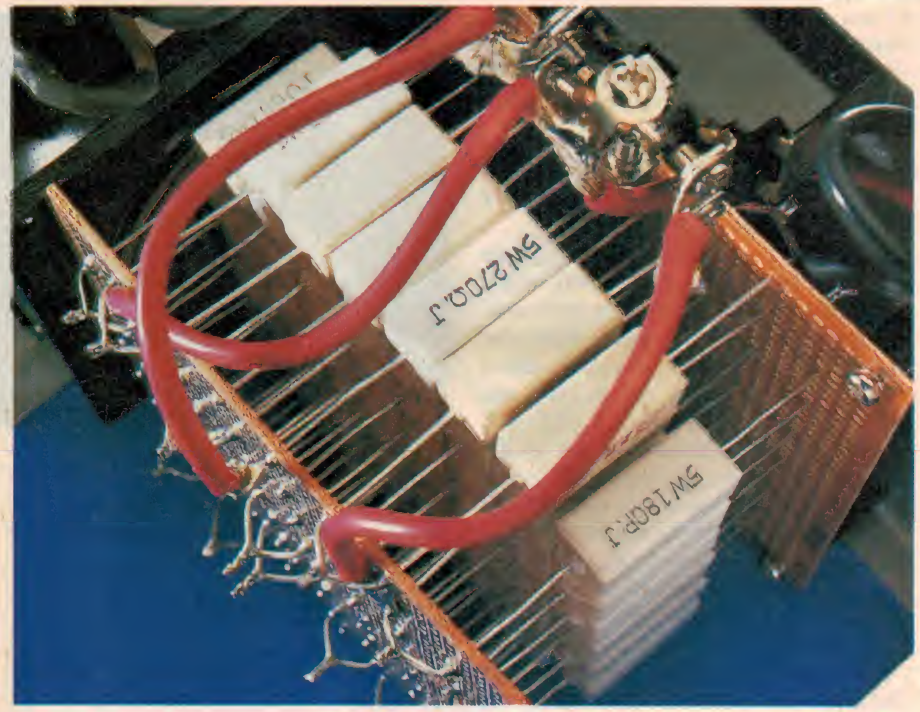
Now comes the trickiest part of all. Once the resistors are all fitted and soldered to the lower board, you need to make sure they're all straight and neatly aligned in their rows and columns — and that their free leads are still straight and vertical, as well. That's because you now have to 'thread' the second stripboard on them all as a group, with each resistor's lead passing through the correct row/column intersection hole.

I found it easiest to start at one end, carefully feeding that row's six resistor leads through the right holes and then bending over about 1.5mm of their free ends, to prevent them pulling back through. Then I worked on the next row, persuading the leads of that eight resistors to pass through their holes. The free ends of *these* were then bent over to prevent them pulling back, while I went on to tackle the next row... And so on. It took a while, and the silence was punctuated by expletives from time to time, but finally all 60 leads were through the second board.

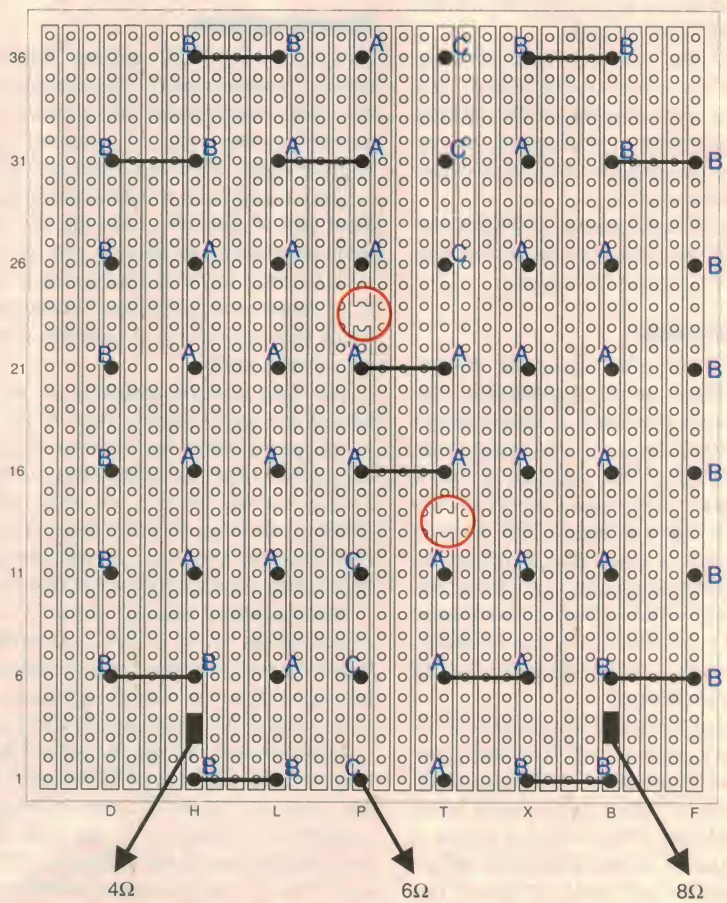
(I do suggest that you tackle this operation in good lighting, so you can peer down between the boards and identify the leads that need 'gentle assistance' to find their correct holes. I also found a pair of long needle-nose pliers very helpful, along with a long but small gauge screwdriver.)

Once all of the leads are through, of course, it's simply a matter of pushing the second board down to the correct level, and soldering the leads to their copper strips. I used a couple of 18mm x 100mm cardboard strips, one on each side of the array, to set the correct board spacing before I made the first few solder joints to hold it in position.

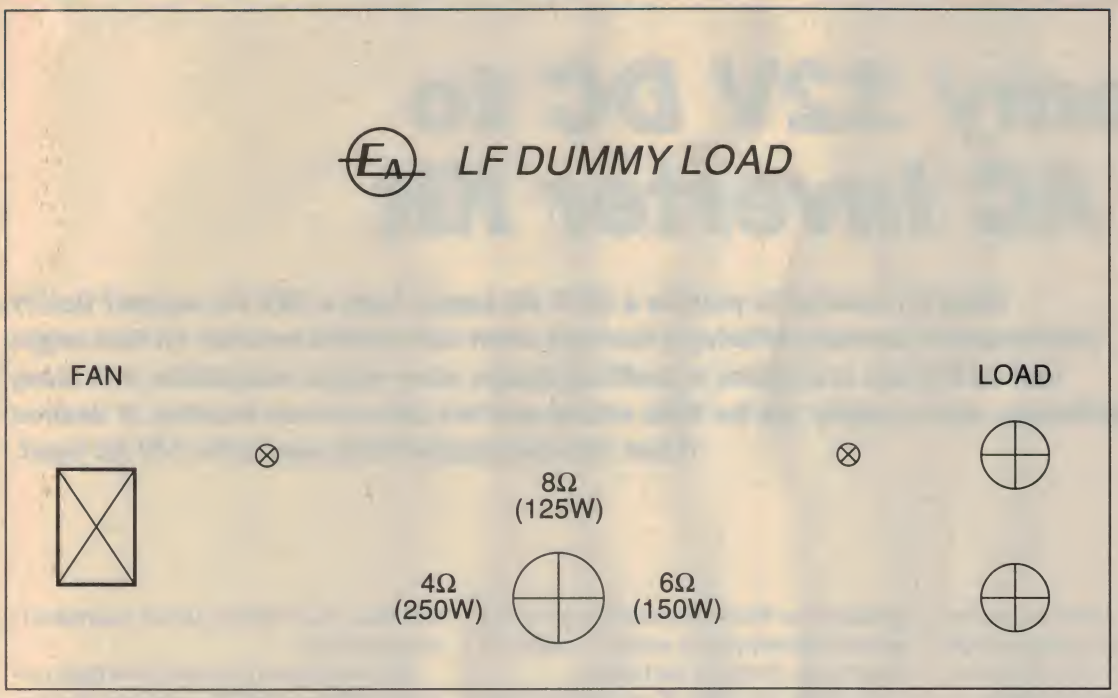
As this stage your resistor array is almost complete. All that remains is to link the various columns electrically, to form the three



Above: this inside view (looking upwards from the bottom) shows the construction of the resistor array and its wiring to the switch. Below is Fig.2, showing the resistor locations and the links on the rear stripboard. The red circles show the only two locations where tracks need to be cut.



RESISTOR CODES: A = 220Ω, B = 180Ω, C = 270Ω



Here's the artwork for the dress front panel, reproduced actual size to allow you to photocopy onto Scotchmark or similar material. A paper copy can also be used as a template for drilling and cutting the various holes.

groups. This can be done using the untrimmed free ends of the resistors on the outer copper side of each board, bending them over and twisting them together before soldering.

Note that ALL of the active columns are linked together on the bottom board, as the resistors all connect together for the 'common' side of the load wiring. I made these links by twisting the resistor leads in a regular pattern, as you may be able to see from the photo. This forms a nice low impedance common connection for them all.

The various groups are formed by the linking on the top board, as shown in Fig.2. Note that this also involves making two cuts in the copper strips for the two centre columns, to separate the two '8Ω' groups at each end from the small centre '24Ω' group. As you can see from the diagram I suggest you make a total of only five links at each end of the board to form the outer groups, with a further two in the middle to form the centre group.

The free end of the centre-group resistor at the bottom of the array can be formed into a loop, for connecting the lead from the '6Ω' switch contacts. Then you can cut off the remaining leads, to tidy things up. Your resistor array should now be complete, and ready to mount in the case when everything else has been fitted.

As mentioned earlier I suggest you put the array aside while you prepare the case and fit the other components. Once you've cut the various holes you can fit the dress front panel if you want one. The artwork is shown in Fig.3, which can also be used as a template for cutting the holes in the front panel.

It's easiest to fit the fan's rocker switch first, with its two lugs having small wires welded to their bases towards the bottom. Then fit the IEC connector, and finally the fan — orientated so that the air flow will be into the case and through the resistor array when it's in place. The wire grille goes on the outside, with flat washers under the screw heads so that they don't pull through the wire loops.

Fit star lockwashers under the nuts mating with each screw on the fan side, and a solder lug and second lockwasher under the mounting nut nearest to the IEC connector. This is to connect to the mains earth, to ensure that the load's case and metalwork are earthed for safety.

You can now complete the mains wiring, making sure that all of the active and neutral connections are properly sleeved with heatshrink tubing to prevent accidental contact.

The next step is to fit the load connection terminals, and then the toggle switch. But before fitting the switch I suggest that you fit a solder lug under each terminal screw — the switch lugs themselves don't seem to be plated for easy direct soldering. I fitted the lugs first with the screws lightly tightened, and then bent each pair over so they met and overlapped, to make it easy to parallel the two sides of the switch when the connection wires were soldered. Then I fitted the switch to the case.

The next step is soldering a short length of insulated stout hookup wire to the lower 'common' load terminal and to the linked copper tracks on the lower (front) board of the resistor array. Then you can fit the array into the case, and you're ready to make the final connections between the active load terminal and the toggle switch, and between the toggle switch and the upper (rear) board of the array.

You might like to check the resistance across the load terminals with the toggle switch in each of its three positions, to make sure you've connected the switch into circuit the correct way around. If all is well, the final step is to fit the other half of the case, and attach four rubber feet to the bottom. Your dummy load should now be complete and ready for use. ❖

Parts list

Resistors

24	180Ω 5W wirewound
30	220Ω 5W wirewound
6	270Ω 5W wirewound

Miscellaneous

1	Aluminium utility box, 150 x 130 x 100mm
1	240V rotary cooling fan 80mm, with guard grille
2	Strip boards, 88 x 153mm (DSE H-5612 or sim.)
1	DPDT centre-off toggle switch, 250V/6A
1	SPST illuminated rocker switch, 250V/6A
2	Binding post/banana sockets, 1 red & 1 black
1	IEC 240V 3-pin mains plug, chas sis mounting

4 x 20mm insulated tapped spacers; 4 x 10mm x M3 roundhead machine screws with flat washers, star lockwashers and nuts; 2 x 10mm x M3 countersunk head machine screws with star lockwashers and nuts; 7 x 3mm solder lugs; heatshrink sleeving; short lengths of stout hookup wire (insulated) for internal connections; four large adhesive rubber feet. Dress front panel if desired.

Economy 12V DC to 240V AC Inverter Kit

Need an inverter to provide a 240V AC supply from a 12V DC source? Oatley Electronics is currently offering a low cost short form 300VA inverter kit that might well do the job. It provides a modified square wave output compatible with many appliances, can be easily set for 50Hz output and has auto turn-on circuitry. If desired it can also be adapted fairly easily for 24V DC input.

BY JIM ROWE

THERE ARE MANY situations where you need to operate electronic equipment and/or other 240V AC appliances, but there's no mains power available — only a 12V or 24V battery, supplying DC. A portable power plant using a small petrol or diesel engine driving an alternator is one option, of course, but can be quite noisy and 'environmentally unfriendly' — quite apart from representing over-kill if you only need a couple of hundred watts of power, as is often the case.

A somewhat more elegant solution is an electronic inverter, capable of efficiently converting 12V or 24V DC battery power into 50Hz AC and stepping it up to the 240V level. They're clean and very quiet, and can also be made fully automatic in operation. They remain in a standby mode when your 240V appliances are turned off, and only spring into operation when power is needed — mainly to conserve the charge on the battery.

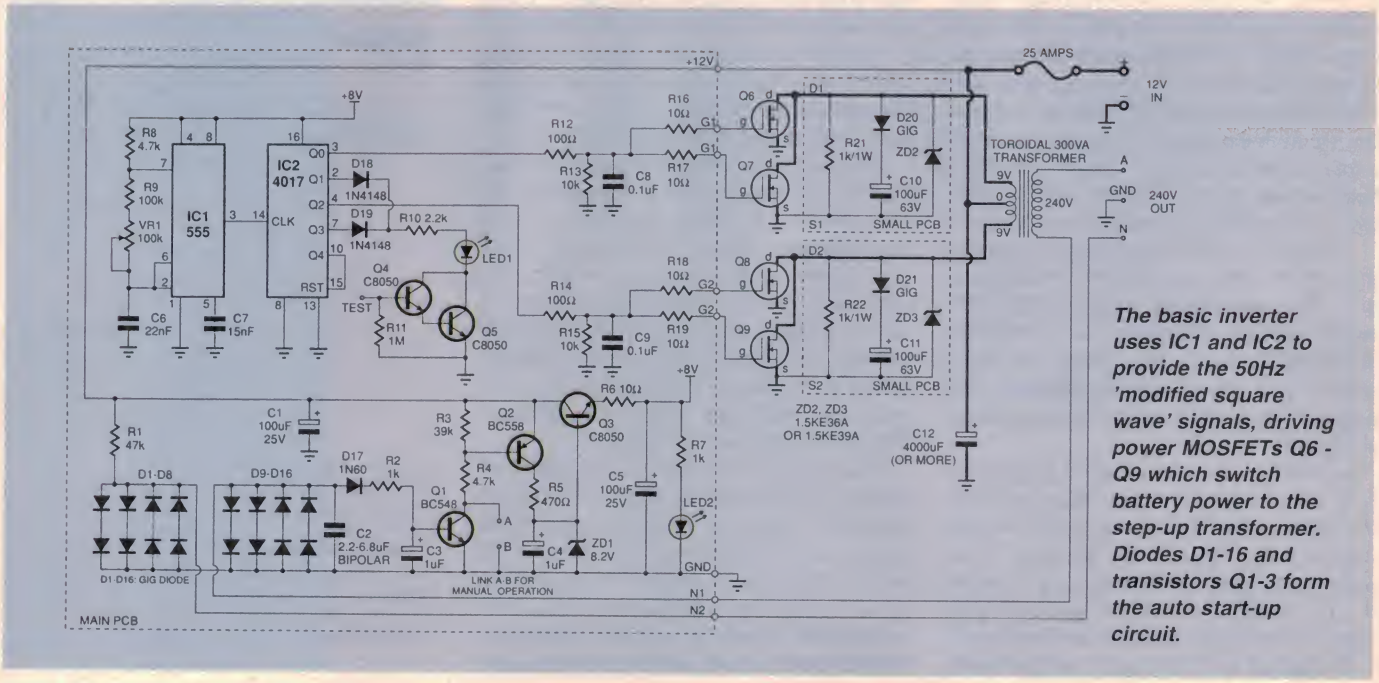
Of course this type of inverter has been available for some time now, in both kit and built-up form and able to supply from 40VA of output up to about 1200VA. We've described a number of them in *Electronics Australia*, in fact. But to be honest most of them tend to be a bit pricey, which can limit their appeal.

If you're someone who has toyed with the idea of building such an inverter, but until now has been put off by the cost, a new kit from Oatley Electronics may well provide the answer. It's being sold in a form which allows you to build up a 300VA (continuous) rated inverter for less than $90, if you already have a suitable case, modest heatsinks and an output socket. This is much less than you'll tend to pay for equivalently rated inverters.

The basic kit is of the short form type, consisting of three small PC boards and the components to populate them, plus a set of four IRFZ44 60V/50A power MOSFET transistors. When it's assembled the largest of the three PCB modules provides the basic circuitry to drive the switching MOSFETs, while the two smaller PCBs provide back-EMF and spike protection for the MOSFETs.

This basic 'short form' kit for an inverter is currently available for only $35 plus postage, so if you have a suitable step-up transformer, reservoir capacitor, heatsink system for the MOSFETs, 240V output socket and a case to build it all into, you can really save a lot of money.

For those who don't have a suitable transformer, Oatley can also supply the kit



The basic inverter uses IC1 and IC2 to provide the 50Hz 'modified square wave' signals, driving power MOSFETs Q6 - Q9 which switch battery power to the step-up transformer. Diodes D1-16 and transistors Q1-3 form the auto start-up circuit.

together with a brand new compact heavy-duty toroidal unit rated for continuous operation at 300VA, plus a used-but-tested high value electrolytic capacitor, for $89 plus postage. With this version of the kit all you need to provide is the output socket, a couple of suitable heatsinks for the power MOSFETs plus a case to house it all in, and you'll have a complete inverter capable of delivering 300VA continuously, and up to around 500VA for brief surges.

Now at this point I should remind you that this type of power inverter is potentially very dangerous, because it transforms relatively safe 12V or 24V DC into much higher voltage AC (about 350V peak) — and with a current capability which is quite capable of killing you if you accidentally become connected across the output. So if you're not very experienced in assembling electronic circuitry, or working safely with circuitry and wiring operating at 240V, you shouldn't really tackle this kind of project or kit at all. You'd be better off getting an experienced technician to build it up for you, or spending the extra money and buying a ready-made inverter.

Essentially the kit is intended for constructors and technicians with enough experience with mains-power projects, to allow them to assemble it, build it into a suitably protective case and use it safely.

That said, it might to worthwhile if we take a look at the schematic of the inverter, to see how Oatley's designer has been able to achieve quite a lot from a relatively small number of low-cost components.

Circuit operation

As you're probably aware, this type of inverter works by using heavy-duty electronic switches (power MOSFETs in this case) to 'chop' up the incoming DC battery voltage, effectively turning it into AC — with a rectangular waveform rather than the smooth sinewave delivered by the mains. This rectangular AC waveform can then be stepped up to 240V, using a suitable transformer.

A toroidal-core power transformer is generally used for this type of inverter, because such transformers are very efficient — and unlike conventional E-I transformers, almost equally efficient whether they're being used to step down the voltage or step it up. Here the transformer is a toroidal unit rated at 300VA and with a 240V winding plus two 9V windings; the latter are connected in series to form a push-pull 9V-0-9V primary, while the 240V winding forms the output secondary.

To chop the incoming 12V DC, it is connected to the centre-tap of the transformer primary, with large electrolytic capacitor C12 also connected from this point to ground, so that it can form a charge reservoir and supply peak current demands. The actual chopping is performed by power MOSFETs Q6, Q7, Q8 and Q9, which as you can see are connected in two parallel pairs, with each pair able to 'ground' one end of the transformer primary, when they conduct.

Needless to say the two pairs are never switched on at the same time. Either Q6 and Q7 are turned on, grounding the 'top' end of the primary, *or* Q8 and Q9 are turned on to ground the 'bottom' end. So simply by turning on either Q6-Q7 or Q8-Q9 we can cause current to flow either 'upwards' through the upper half of the primary, or 'downwards' through the lower half. In short, we can use the MOSFET switches to provide the transformer with push-pull AC drive.

What's the purpose of Zener diode ZD2, diode D20, capacitor C10 and resistor R21 across Q6 and Q7 — and the equivalent network across Q8 and Q9? These parts are to absorb switching transients and protect the MOSFETs from damage. The idea is that for efficient conversion of the DC into AC, the MOSFETs must be switched on and off very quickly; yet the transformer windings inevitably have significant leakage inductance, which reacts to sudden changes in current level by generating large 'spikes' of back-EMF. The suppression networks shown limit these spikes to a level which is within the ratings of the MOSFETs, and thereby prevent them from being damaged.

By the way, if you haven't already realised it, if we don't turn on *either* pair of MOSFETs, virtually no current flows through either half of the transformer primary. (Just a small amount through resistors R21 and R22 — about 24mA total.) This is in fact the situation when the inverter is connected to the 12V battery but in 'standby' mode: all four power MOSFETs are off, and no significant power is being drawn from the battery.

Now to bring the inverter 'to life', the

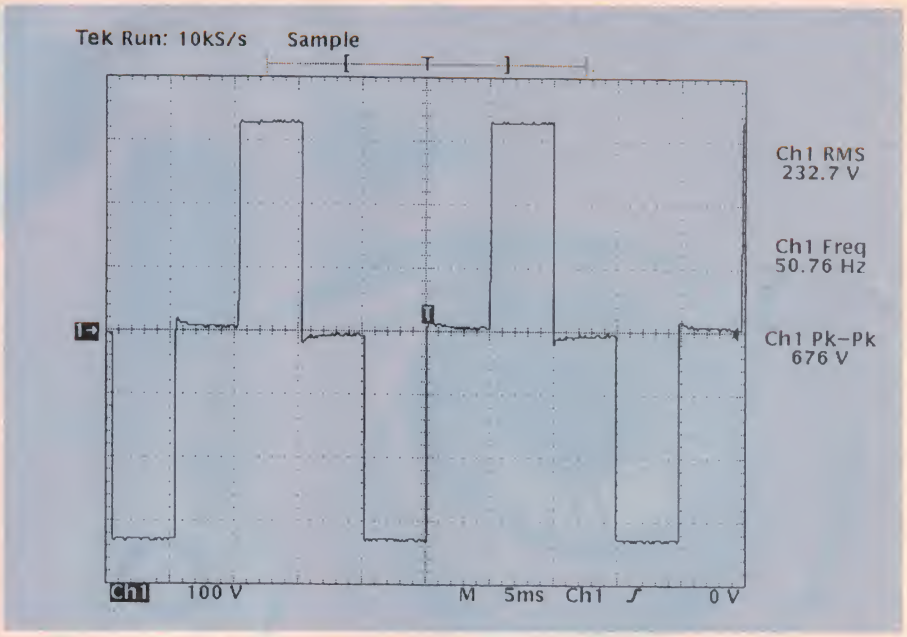


Fig.1: A sample of the inverter's 'modified square wave' output waveform. Note the 5ms 'rests' between the conduction pulses.

MOSFET pairs need to be fed with gate drive signals which turn them on in alternate fashion, at the 50Hz rate. Although this *could* be done by simply feeding them with bipolar 50Hz square waves, this simple approach isn't desirable — for two reasons.

One reason is that switching delays would tend to result in both pairs of MOSFETs being 'on' together very briefly, during each polarity reversal, which would result in wasted power. The other reason is that the inverter's output would be a 'pure' square wave, and this is not suitable for powering many appliances; it can even result in damage.

To avoid these problems, the MOSFETs are driven with signals which still turn them sharply on and off (for efficient switching), but with significant 'gaps' or 'rests' between the conduction of each pair. This modified square wave operation not only minimises power wastage, but also delivers an output waveform that is much more compatible with most 240V appliances. This is because while still rectangular, it roughly approximates to a sine wave in terms of peak-to-RMS voltage ratio.

In the Oatley design, when it's operating at 50Hz, one pair of MOSFETs is turned on for 5ms, and then both pairs are left off for a further 5ms. Then the other pair is turned on for 5ms, and finally both pairs are left off for a further 5ms to complete the 20ms cycle (see Fig.1). As you can see current is actually drawn from the battery only 50% of the total time, but in a very efficient manner.

The circuitry needed to provide the MOSFET pairs with these alternate and spaced 5ms gate drive pulses is simpler than you might expect. The basic timing is set by IC1, an astable clock oscillator using a standard 555 timer chip, which is set to operate at 200Hz (four times 50Hz) using adjustable resistor VR1. The output from IC1 (basically a train of 5ms pulses) is then used to drive IC2, a 4017 Johnson counter connected here with feedback so that it resets on the fifth pulse. This makes IC2 perform as a 'divide by four' counter, with its outputs already decoded. So when the circuit is operating IC2's outputs (pins 3, 2, 4 and 7) effectively go positive for 5ms in turn, cyclically.

As you can see MOSFETs Q6 and Q7 are driven from pin 3 of IC2, via a simple passive conditioning network comprising parasitic suppressor resistors R16-R17, pulldown resistor R13 and R12-C8, which form a ringing suppressor. Similarly MOSFETs Q8 and Q9 are driven from pin 4 of IC2 via an identical conditioning network.

So when IC2 is counting Q6 and Q7 are first turned on for 5ms, by a high on pin 3; then both pairs are left off for 5ms while the pin 2 output is high; then Q8 and Q9 are turned on for 5ms while pin 4 is high; and finally both pairs are left off again while pin 7 is high. Then when pin 10 goes high, on the fifth pulse from IC1, this resets IC2 via the link to reset pin 15, and the cycle begins again...

Why doesn't this happen *all* the time? Ah — because as you can see, IC1 and IC2 both operate from a nominal +8V supply rail, derived from the 12V battery voltage via the circuitry around transistors Q1, Q2 and Q3. The purpose of this circuitry is to turn the inverter on and off only as needed, by switching the +8V rail on and off (and hence either enabling or disabling IC1 and IC2). In other words, it's this circuitry that performs the 'auto turn-on' function.

The idea here is that Q3 is connected as a simple emitter follower, acting as a series-pass voltage regulator. Its base is connected across zener diode ZD1 and filter cap C4, so when current is supplied to them both via switching transistor Q2 and resistor R5, about +8V (actually nearer +7.6V) appears at the emitter of Q3, to supply IC1 and IC2 with current via the smoothing filter formed by R6 and C5. Indicator LED2 also receives current via R7, to show that the inverter is operating.

Needless to say transistor Q2 is turned on by supplying it with base current — essentially by grounding the lower end of resistor R4. And this can be done in either of two ways, one of which is by shorting points A and B. So if you connect a small switch between these points, it becomes a manual on/off switch for the inverter (if you want one).

The other way to turn on Q2 is by turning on transistor Q1, as you might have guessed. This is in fact how the auto turn-on function operates.

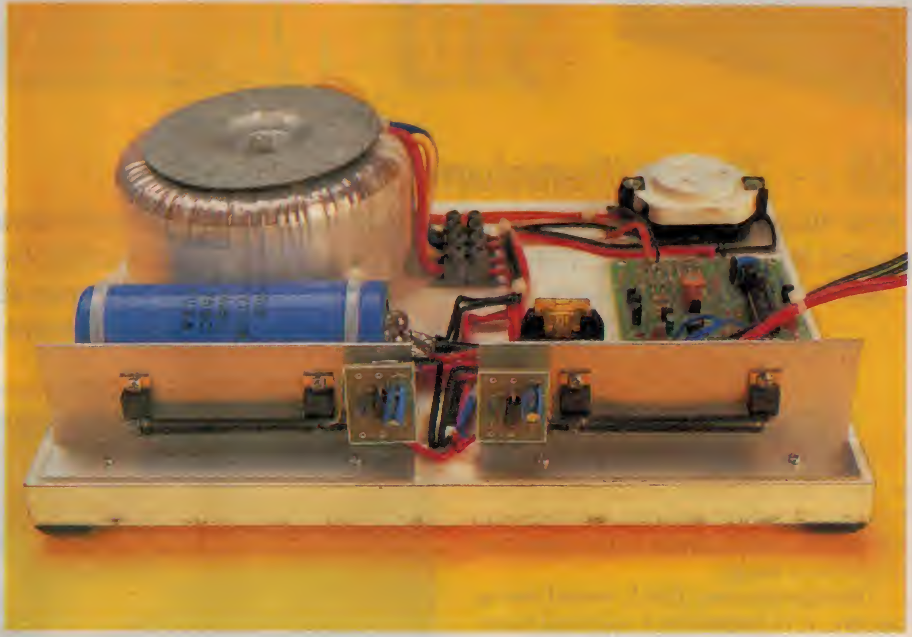
As you can see, the base of Q1 is fed via resistor R2 and series diode D17 from the tops of protective diodes D9-D16, with capacitors C2 and C3 for filtering. And a small positive bias, capable of turning on Q1, is derived from the +12V rail via resistor R1, to the tops of the second set of proective diodes D1-D8. But the only link between the two is via the two lines N1 and N2, which run back to the 'neutral' output line from the step-up transformer. This means that if there's no load connected to the transformer, there will be no continuous circuit formed between N1 and N2, and no forward bias is supplied to Q1. It therefore doesn't conduct, the +8V rail remains switched off and the inverter remains in the 'standby' mode.

On the other hand when a load is connected to the output of the inverter, this generally completes the DC circuit via the transformer secondary, and current can now flow between N1 and N2. This allows bias current from R1 to reach the base of Q1 via D17 and R2, and Q2 conducts — turning on Q2 and Q3 in turn, and hence supplying +8V to IC1 and IC2. The inverter thus springs into life and supplies output to the load.

What is the purpose of all those diodes D1-D16? Simply to protect Q1 and the rest of the auto switch-on circuitry from the high voltage and significant currents that will be present on the inverter's neutral output line, when it *is* operating. They also ensure that regardless of the load current, the overall voltage drop in the inverter's output neutral line (due to the our turn-on sensing) is no more than four diode drops (i.e., about 2.8V), for either output polarity.

But why then are components C2, D17, R2 and C3 needed, in the base circuit of Q1?

Here's the demo kit, assembled by Oatley to show how easily it all goes together. In practice you'd enclose it all in a case for safety...



Basically because once the inverter is operating, a rectangular AC waveform of about 2.8Vp-p appears at the top of diodes D9-D16, along with the DC bias from R1. This in effect chops up the forward bias for Q1, so we need diode D17 and the filtering/reservoir action of R2/C3 to provide smoothing and ensure that Q1 remains conducting continuously. C2 is for suppression of spikes and charge-storage transients due to diodes D1-D16.

So that's how the basic inverter operates. The only circuitry yet to explain is that around LED1, transistors Q4 and Q5, and diodes D18 and D19. This is actually a nifty little 'beat indicator' which lets you set the inverter output frequency to 50Hz, without needing test instruments.

As you can see D18 and D19 are connected to the two outputs of IC2 that *aren't* used to drive the output MOSFETs. Their cathodes are connected together and used to feed R10 and the anode of LED1, which therefore receives what is essentially a square wave of twice the inverter's output frequency.

The cathode side of LED1 is connected to ground via Q4 and Q5, configured as a high-gain Darlington pair with the base of Q4 tied low via 1M resistor R11, and also connected to the 'Test' pin. The basic idea is simple: when you run the assembled inverter on your test bench, touching your finger to the Test pin supplies a small amount of 50Hz hum to the base of Q4, from that induced in your body from the nearby house wiring. This switches Q4 and Q5 on and off at a 50Hz rate, and LED1 therefore finds itself only able to conduct current at this rate — but fed with a signal from D18 and D19, at twice the inverter's output frequency (i.e., around 100Hz when the inverter is set for 50Hz).

The nett result is that if the inverter is set for a frequency that's higher or lower than 50Hz, LED1 tends to blink at the 'beat' frequency. This means that simply by adjusting VR1 to slow down and stop the blinking of LED1, you are able to set the inverter frequency very close to 50Hz.

Note that although the circuit shown, and the basic kits that Oatley is supplying, are designed for a nominal DC input of 12V, the kit can be adapted fairly easily for operation with a 24V DC supply.

Needless to say the power MOSFETs need to be changed to a type with higher voltage rating — say the IRF540, with 100V rating. Similarly protective zeners ZD2 and ZD3 need to be replaced with units of higher voltage rating (say 72V), or else each replaced with two 36V diodes in series. The output transformer also needs to be replaced with one having low-voltage windings of say 16V-0-16V, instead of the 9V-0-9V windings in the kit transformer.

Finally, it's also necessary to replace Q3 with a device having a higher voltage rating — like the BD139, with a 60V rating instead of 25V for the C8050. But these substitutions should be all that's needed to produce a 24V version.

Oatley 300VA Inverter Kit

A low cost 'short form' kit for building 12V-240V (or 24V-240V) inverters of 300VA continuous rating.

***Good Points**: Significantly cheaper than competing units, if you can supply case, heatsinks and output socket; reliable auto turn-on circuitry, or optional manual control. Easily set for 50Hz operation.*

***Weak Points**: Not for beginners. To ensure reliable and safe operation, the builder needs to be experienced in assembling and testing 240V equipment.*

***RRP**: $89 plus postage, including 300VA transformer and reservoir electro.*

***Available**: Oatley Electronics, PO Box 89, Oatley NSW 2223. Phone (02) 9584 3563, fax (02) 9584 3561 or visit their website (**www.oatleyelectronics.com**).*

Trying one out

Although the inverter would normally be fully enclosed in a protective case, for safety, Oatley Electronics built up the 'demo' inverter shown, and loaned this to us for evaluation. As you can see from one of the photos it simply had the components laid out on a small plastic-laminated baseboard, with two 120mm lengths of 40 x 40mm aluminium 'T' extrusion forming the heatsinks for each pair of power MOSFETs.

I should note here that the toroidal transformer fitted to the demo kit is significantly smaller than those actually being supplied in the production kits, which are rated at 300VA continuous and about 500VA for short periods. Oatley sent us a sample of the production transformer, which is very sturdy and well made.

We hooked up the demo unit to a high-current DC power supply for basic testing, and mainly used a series of incandescent lamps for test loads. We found the auto turn-on circuitry worked very well on all typical loads we tried — except for compact fluorescent lamps, whose electronic ballasts presumably don't provide a DC load of low enough DC resistance. For driving these, you'd need to operate the inverter with a manual on/off switch linking A and B on the main PCB.

With a 13.8V DC input the low-load output voltage from the demo unit was a trifle low, measuring 232.7V RMS. However the load regulation was quite good, dropping by only 9.7% at the 200VA level (which was as far as we were able to go, with the power supply we were using). Our impression is that with the larger transformer being supplied in the production kits, and when the inverter is being driven by a suitable well-charged battery, it should have no problem coping with a continuous load of 300VA.

So if you need a 12V-240V inverter for loads of up to 300VA, but haven't been able to justify the cost of existing inverters, this new kit from Oatley Electronics is well worth considering. Of course you wouldn't build it in the 'breadboard' fashion of the demo unit — instead, make sure everything is securely mounted inside a sturdy metal or plastic case, with all high voltage connections carefully insulated to prevent accidental shocks. ❖

$10 WONDERS

28 — The Millennium Bug

Now that the silly season is almost upon us there have been several reports of sightings of the so-called Millennium Bug. The photo shows one we found feeding on the Petunias in our veggie patch. But keep the fly-screens securely closed at all times for, once it gets indoors, the Millennium Bug will play havoc on your computer, as our second photo dramatically demonstrates.

Studies of recently found specimens have revealed some interesting facts about its biology. Although it is partial to little bits of Petunia, its primary energy source is a complex reaction involving zinc and carbon, which results in the generation of electrical energy.

Although you may find it around during the day, it is essentially a nocturnal beast. After dark, it attracts its mate by the green-tinted flashes that come from the luminous organs on the upper side of its thorax. At the same time it emits a plaintive chirping sound from a vocal organ which takes up the greater part of its abdomen. The only way to silence it is to flash a torch on it or remove its energy supply.

Identity

Mention of the luminous organs raises questions about the affiliations of this curious insect. From the fact that it has a single pair of wings we would put it in the Order Diptera. This means it is certainly not a Bug, for Bugs belong to the Order Hemiptera. Further, the fact that it stands on only four of its legs, raising the third pair up behind it, puts it clearly in the genus Anopheles - in other words, it's a mozzie!

This claim to be a Millennium Mozzie is dashed when we consider its proboscis, which is a blunt affair more like that of a blowfly. The assertion is further squashed when we note that it has these four luminous organs. In this respect it obviously belongs in the Order Coleoptera. It is the kind of beetle known as a glow-worm! Here we must leave the discussion to more eminent entomologists and just concentrate on trying to keep the thing away from our computers.

How it works

The circuit (Fig.1) is based on a 7555 timer IC (IC1) wired as an astable with a frequency of about 2.5Hz. You can use other values for R2, R3 and C1 if you prefer a different flashing rate. The output from pin 3 alternates between 0V and 3V. When the output is at 3V, current flows through the four LEDs. Because of the low voltage across them, the LEDs do not need series resistors. Also wired in parallel with the LEDs is an audible warning device or cheap piezo siren. Some of these produce an intermittent note or a warbling note but the cheapest produce a single tone. These are quite suitable, because the astable turns it on or off.

The most important point is that the AWD must be rated to operate on only 3 V. There is a slight possible confusion here. Some piezo devices incorporate their own

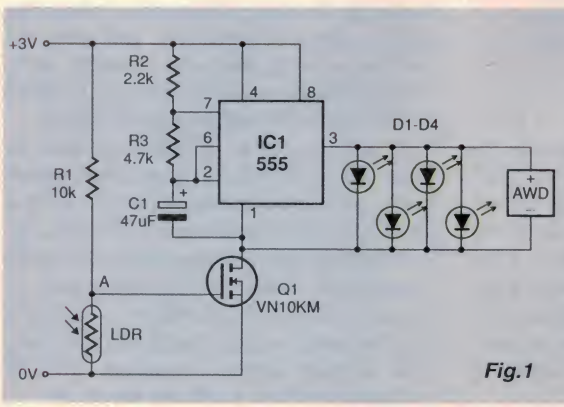


Fig.1

At right is the overlay for the brains of the bug, with the board extending out each side to give the appearance of 'wings'. On the left is the whole circuit, with a 7555 flashing the LEDs and sounding the beeper. MOSFET Q1 switches the circuit on whenever the room gets dark enough.

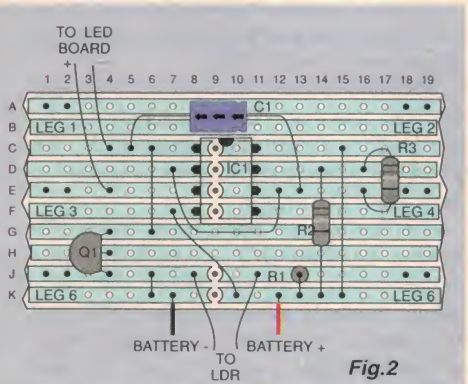


Fig.2

oscillator to produce the tone or tones of the required audio frequency or frequencies. Some are just slices of piezo material and make no sound unless they are connected to a signal source. This project needs the type of piezo device that has a built-in oscillator.

The light-dependent resistor provides the light-sensitive response of the Bug. This is connected in series with R1. The two resistors form what is called a *potential divider*. The voltage across the pair of resistors is 3V. The voltage across each resistor is proportional to its resistance. For example, in daylight or typical artificial light, the resistance of the LDR is about 10k. Under these conditions the voltage across the LDR (that is, the voltage at point A), is 1.5V or less. This is insufficient to turn on the MOSFET Q1. No current can flow through it and the astable circuit does not operate. In darkness, the resistance of the LDR rises to about 500k or more and the voltage across it rises above 1.5V turning Q1 on. Now current flows through Q1, turning on the astable, starting the LEDs flashing and the AWD chirping.

Construction

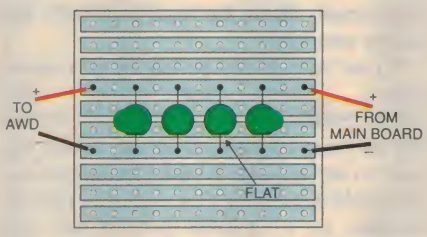
The actual electronic construction is relatively simple but there is plenty of scope for ingenuity in putting together. It is best to begin by collecting together all the bits and pieces that you intend to use. We used a double AAA battery holder, as this happened to be handy from the junk box. It is a PCB-mounting holder with two terminal wires instead of the usual pair of tags; these we could push up through the circuit board and bend over to resemble a pair of antennae. The pair of studs on the end of the box looks like a pair of eyes. If your battery holder is different, make the best use you can of its special features.

The arrangement of components is intended to give an approximately symmetrical appearance, so it is a little more difficult than usual to understand the layout. Take care to get all the components and wires in their correct places. Test the circuit after you have assembled the astable and the MOSFET switch. Note that the LDR that we used had very long leads, so we bent these around to make the LDR look like a proboscis.

The most difficult assembly task is to push the terminal wires of the battery holder up through the board, and soldering them in. Take care not to melt the holder with the soldering iron! If this proves difficult, or if your battery box has solder tags, run connecting wires from the box to terminal pins on the board.

The main circuit board is placed crossways across the battery box, so that it looks like a pair of wings. The components are mounted in the central region of this, leaving the actual wings clear. If you prefer, you can make a small cardboard cover to go over the components, but we thought it looked more sinister with its works exposed. Another suggestion is to glue tufts of coloured cotton wool over the components (*after* the circuit has been checked, of course.

Oh, no!, The Millennium Bug is stalking my computer! Buzz off.. Shoo! Below is the ultra-simple layout of the light-up abdomen for the bug. You could add more LEDs if you like, but be careful that you don't overload the 7555.



Parts List

Resistors

(all 5%, 0.25 W)

R1	10k
R2	2.2k
R3	4.7k
R4	optional, see text

Capacitors

C1	47uF 16VW electrolytic

Semiconductors

D1-D4	5mm green LEDs
IC1	7555 CMOS timer IC
LDR	ORP12 LDR or equiv. 11k in daylight (approx.)
Q1	VN10KM MOSFET

Miscellaneous

3-6V AWD or buzzer; Stripboard 25 x 100mm (10 strips x 39 holes) plus another smaller scrap; 1mm PC pins; battery holder 2 x AAA; polystyrene tubing, 4mm diameter.

The secondary circuit board holds the LEDs, which can be mounted in any way you choose. We decide on a single row, to suggest the segments of the thorax (Yes! there should have been three LEDs. This must be a mutant.) The cylindrical AWD makes a well-shaped abdomen and we left its leads long to suggest a sting.

The six legs are made from a length of white polystyrene tubing 4mm in diameter and cut into suitable lengths. This is obtainable from any model shop. Having cut the segments for one leg, cut a piece of ordinary single-cored hook-up wire just over twice as long as the leg is to be. Strip the insulation from the wire at both ends (about 15mm). Bend the wire in half, but not sharply, and thread both halves through the lowest segment. Leave a small loop protruding and bend this roughly at right angles to the segment to stop the segment from slipping off. Thread the other segments on the wire. Finally solder both wires to the circuit board where shown in Fig.2. Note that both ends of the wire are soldered to the same copper strip, so there is no short-circuiting through the legs. The legs bend into any position.

Double-sided self-adhesive pads are useful in holding things together, particularly for fixing the circuit boards and the AWD in place. The rest of the construction we leave to your imagination and skill.

If you prefer to operate on other voltages the only change that needs to be made is to include a series resistor between the positive supply and the cathodes of the LEDs. For 6V this should be 56Ω and for 9V it should be 100Ω. Use an AWD rated to operate at the voltage.❖

COMPUTER CLINIC

Replacing files, Casting spells, Helping Windows and linux get on together, and doing the new Samba...

No replacement

The REPLACE command in DOS 6.22 which I used to find very useful to update files, has disappeared. The command is no longer available under Windows95/98. It is possible to emulate the options which used to be provided by REPLACE if you use various switches with the XCOPY command. Notably the /D (with or without a date) and /U. However, those date/time dependent switches of the XCOPY command are not available if you boot up in Command Prompt mode. They are only available if you shell out of Windows or run a batch file from within Windows.

I do have Laplink for Windows which can do all sorts of fancy replacement options, and it works just fine with my Pentium II and my laptop, but it's such a large program that my poor old 486DX33 takes ages to achieve anything with it. I also have Laplink Pro (the best DOS version) which works very well, but I'm a bit concerned that it might muck up the extended file names although I have not had any trouble with it so far.

Why didn't Microsoft carry over an upgrade of REPLACE.EXE from DOS 6.22 to Windows 95/98? It was compact, quick and easy to use, and not a memory hog either. Not having it is a real nuisance. Bloatware seems to be the order of the day! This is an inexcusable oversight, when you think of the millions of person-hours they have spent on developing Windows and its applications. (David Pulford, via email)

Yes, Microsoft can be annoying at times... every 'upgrade' seems to remove all the really useful features, and put in half a dozen others you'll never need. The device driver selection wizard is a good example of this. The version that came with the original upgrade version of Win95 was simple, straightforward, and didn't muck around. With each subsequent release, that one wizard grew less and less usable, with more and more frills added until it became the mess that is is now in Win98.

Mind you, it's the concept of bloatware and planned obsolescence that drives the whole computer industry. The digital version of inflation, if you like. The software companies write bigger, slower code, and the hardware people go frantic trying to produce bigger, faster hardware to cope with it. The whole process is of course paid for by the hapless consumer, but you are always free to get out of the rat race any time and settle down with a nice little XT...

Right, well I'll get down off my soapbox now, and take a crack at solving your problem. The 16-bit version of XCOPY just isn't going to do what you want, so we'll need to try another tack. The direct approach would be to snaffle the REPLACE.EXE file out of your old DOS installation, and stick it somewhere in your path, such as C:\WINDOWS\COMMAND. Unfortunately, if you then try to run REPLACE, it will die with "Incorrect DOS version". Luckily, however, there is a sneaky way round this in the form of SETVER, a rather odd little hack that lies to programs about the version of DOS that you're running.

To use it, it has to be loaded as a device driver, so add the line DEVICEHIGH=C:\WINDOWS\SETVER.EXE to your CONFIG.SYS file. Then you need to add an entry to the version table, to tell it which program you want it to fool. To do this, go to a DOS prompt and type SETVER REPLACE.EXE 6.22. You only need to do this once, as it saves the entry to disk — in the SETVER.EXE file itself! Not the way I would have done it, but still...

Anyway, once you've done all that, reboot into either DOS or windows, and you'll have your REPLACE command back again for keeps. (Of course, it's not going to handle long filenames correctly, but then neither is any 16-bit DOS program.) If this all looks too messy, you could simply go to **http://www.simtel.net/simtel.net/msdos/fileutil-pre.html** and download a copy of Zcopy or Icopy, two little freeware XCOPY replacements that come with time/date filters, and lots more as well.

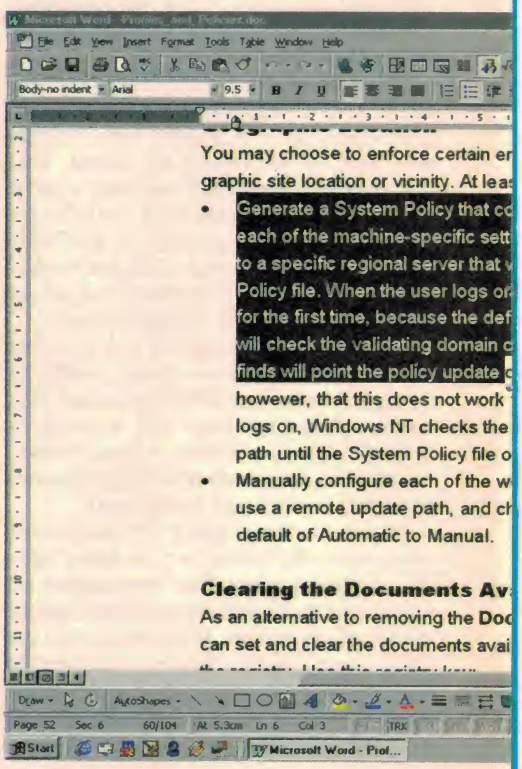
Spell casting

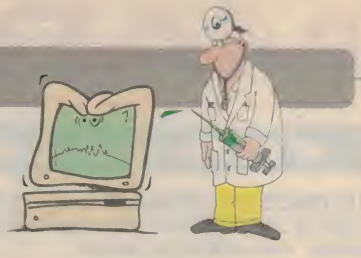
I have a problem with dictionaries for spell checking. Two PCs have both Windows 95 and Word 97, one of which has MS Works as well. Works uses an Australian dictionary by default and spell checks correctly, but Word 97 will not use the Australian dictionary, only the USA one.

The other computer only has Word 97 on it and uses both Australian and USA dictionaries, but it changes from one to the other while spell checking large assignments. This is even though the default language is set to Australian english. As you can imagine, this is disastrous for legal documents...

C:\Program Files\Common Files\Microsoft Share\Proof seems to contain the dictionaries; what I want to know is can I delete the USA dictionary without affecting the Australian dictionary? Although all the filenames end in 'en-lex', which I take to mean Lexicon, and a BR and a AM appears in two of these file names, some may be required for full operation of the dictionaries. Deletion of the USA file should overcome the switch back and forth between the dictionaries during long spell check operation. Is this the right approach? (Carl Dehlsen, via email)

First up let me say that simply deleting files from any software installation is not a good idea, especially if you're not sure that they can be safely deleted. If you do want to



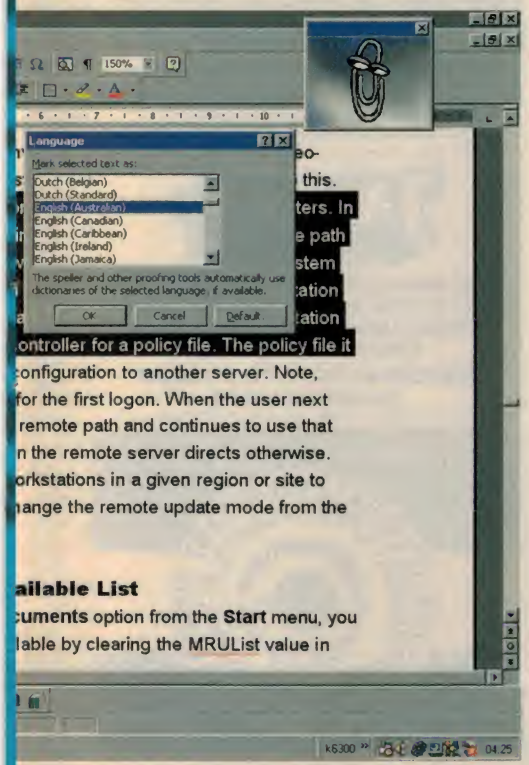


Got any computer queries? Whatever is bugging you, from hardware problems to C programming, send it in and we'll soon have you fixed up. You can email your question to electaus@fpc.com.au, or fax or mail it in to us here at EA.

experiment, try renaming the file instead. I usually enclose the filename in parentheses, as this not only prevents the file from being found either by filename or extension, but it makes it easy to rename it back if you discover that you do need the file after all.

In your case, however, I don't think this is the way to go about it. As far as I know, the only time that Word will change dictionaries is if a section of text is marked as being in another language — if the section has been inserted from a document created in US english, then the text will be treated as US english and spellchecked accordingly. The way round this is to select all the text in the document, then go to Tools|Language|Set language, select English (Australian) and hit OK.

By the way, if you're having trouble getting Word to default to the Australian dictionary, you can usually fix this by going to Control panel|Keyboard, installing the English (Australian) layout, and setting it as default. Word gets a little too clever for its own good sometimes, and overrides its own default language setting with the language specified in the keyboard definition.



Linux connectivity

If you have ever installed and used linux, you may well have felt that you were in another world. linux' directory structure is huge and intricate, the user interface is radically different from Windows, and none of your favourite apps are there... The context shift often gets too much for people, and they go back to Windows, which is a shame. Even with a dual-boot setup, many people use linux just to fiddle around with, and don't tend to do any serious work with it. Because it's so hard to share files between the two environments, linux often ends up in the corner and forgotten about.

If you do dual-boot between Windows and linux, you'll know just how annoying it is not to be able to access your linux drives under Windows. The number of times I've watched the Windows splash screen come up and suddenly realised that I've left a file in my home directory instead of on the file server... Also, there's a huge amount of interesting stuff that comes with your average linux installation, and there's just no way to get at it under Windows, or at least there wasn't until now.

Peter Van Sebille's FSDEXT2 for Windows 95, avaliable from **http://www.yipton.demon.co.uk**, gives you access (albeit read-only) to all your linux partitions. The nice thing about it is that it's implemented as a filesystem driver. This means that the partitions get mounted as virtual drive letters under Windows, allowing you to access them with Explorer, DOS commands, or any other software, just like normal Windows drives.

Installation is dead simple, you copy two tiny files to the Windows SYSTEM and IOSUBSYS directories and reboot. After having a good old whinge at Windows for having to reboot after every tiny little change, the true linux fans among you should get a kick out of typing MOUNT /DEV/HDA5 at a C:> prompt... Beautiful!

If you really need write-access to your linux drives, check out Explore2fs, from **http://uranus.it.swin.edu.au/~jn/linux/Explore2fs.htm**. Explore2fs is a self-contained application, not a filesystem driver, so you are limited to using its own interface to read and write files. The write-access mode *is* still experimental, and if anything goes wrong, such as the system going down unexpectedly before re-syncing the linux partition, then you stand a chance of seriously damaging the filesystem. The interface is still a little rough around the edges, but it certainly gets the job done.

Also, if you want to use your linux box to access Windows shares on your LAN, you need to use Samba, which comes with most linux distributions by default. One thing to note is that the latest version of Samba, V2.05a, has just been released, and is a lot simpler to use than the rather cantankerous version 2.03 released with Redhat 6. Mounting a share is now as simple as typing smbmount //server/share /mountpoint -U username, with no other configuration needed. If you need to connect linux and Windows machines, go and get yourself a copy of this incredibly useful package from **http://au2.samba.org/samba/ftp/Binary_Packages.** ❖

MARKETPLACE

FOR SALE

1/3 PRICE Heat Shrink Tubing CSA **UL** 125C **2 : 1 Shrink** GP **600 Volt** from **20 cents** www.allthings.com.au

SATELLITE TV **DIGITAL** RX **NTSC to PAL** MPEG-2 **FTA** EPG **Encryption CAM** from **$399** www.allthings.com.au

VIDEO STEREO TRANSMITTERS & RECEIVERS $149 Multi Channel up to 500 metres www.allthings.com.au

BITZ 25W Transceivers **Sat TV RXs** VCRs **ABS** CROs **Yagis** Isolation TXs **CCTV Equip** Gas Detectors **16 mm Projectors** Components www.allthings.com.au

FREE Heat Shrink Tubing with Camera orders this Month * **VIDEO & STEREO 2.4 GHz Multi Channel TRANSMITTERS & Scanning RECEIVERS from $142** * PIR MOVEMENT DETECTOR inbuilt concealed PINHOLE Mono or DSP COLOUR Camera, Microphone & Timer/Controller for VCR - Lights - etc from $139 * **BULLET CAMERAS 22 mm dia 480 Line 0.05 lux SONY CCD or DSP COLOUR from $132** * QUADS 4 Pix 1 screen from $256 HI-RES better than SUPER-VHS Quality * **Modules 32 x 32 from $76 also with Tiny Hi-Sens On-Board MICROPHONE** * COLOUR DSP 32 x 32 mm Pinhole Module with MICROPHONE from $155 * **MINI 36 x 36 from $85 - SONY CCD $102 - COLOUR DSP $162 * DOME from $88 - SONY CCD $105 - COLOUR DSP $164** * Video BALUNS from $11 * **DIY PAKS: 4 Cameras, Switcher & Supply from $499 - with 14" Monitor from $601 with MUX for FULL SCREEN / RESOLUTION RECORDING from $1209** * 4 COLOUR CAMERAS, SWITCHER & POWER SUPPLY from $807 - with COLOUR QUAD 4 Pix 1 Screen from $1211 * With MUX $2033 * **COLOUR QUADS from $512** * COLOUR DUPLEX MUX from $1329 * **14" MONITORS from $218 - with Inbuilt 4 Ch SWITCHER from $256** * SEE-in-the-DARK CAMERA & INFRARED ILLUMINATOR Kits from $19 * **ANCILLARY EQUIPMENT** * DISCOUNTS * **BEFORE YOU BUY Ask about New Enquiry Offer** & visit our Web Site at www.allthings.com.au
Ph 08 9349 9413 Fax 08 9344 5905

Video Amplifiers, Stabilisers, TBC's Processors, Mixers, Etc. QUESTRONIX (02) 9477 3596

FREE PCB DESIGN SOFTWARE: WinBoard PCB Layout WinDraft Schematic. 100 to Unlimited pin versions from $5 or download from ME: http://www.me-au.com.

AUDAX High-Tech European Speaker Drivers from $11. **ME Technologies (02) 6550 2254**

Win $500 USD CASH dontronics.com

SPICE SIMULATION - Send $5 for evaluation CD - demos, models & info on Intusoft SPICE products. ME Technologies PO Box 50, Dyers Crossing NSW 2429, Fax: (02) 6450 2341

Printed Circuit Board Comprehensive details at http://www.acetronics.com.au email acetronics@acetronics.com.au

FOR SALE

Amidon Ferromagnetic Cores: For all RF applications. Send business size S.A.S.E. for data/price to RJ & US Imports, Box 431, Kiama NSW 2533. www.cyberelectric.net.au/~rjandusimports Agencies at Assoc TV Service, Hobart; Truscotts Electronic World, Melbourne and Mildura; Alpha Tango Products, Perth; Haven Electronics, Nowra

Visit us at www.quest.au.com Video Equipment, Information, Interesting Links QUESTRONIX http://www.me-au.com.

Wanted: Early HiFi, amplifiers, tuners, turntables, speakers, valves, Quad, Leak, etc. Cash paid (07) 5449 1601

Printed Circuit Boards for all Magazine projects then goto http://www.cia.com.au/rcsradio RCS Radio - BEXLEY (+61 2) 9587-3491 free EASYTRAX CAD software & Amateur Radio. plus the Master list of all Electronic Projects.

Rain Brain Sprinkler Kits: 8 station sprinkler controllers. 8 and 60 channel temp. monitors with PC Data logging. **Mantis Micro Products,** http://www.home.aone.net.au/mantismp

PCBs Made, One or Many. Low prices, hobbyists welcome. Sesame Electronics Phone (02) 9554 9760 sesame@internetezy.com.au http://members.tripod.com/~sesame_elec

ADVERTISING RATES FOR THIS PAGE

Small ads:

The minimum acceptable size of two centimetres x one column costs only $70. Other sizes up to a maximum of 10 centimetres are rated at $40 per centimetre.

Line classifieds: $6 for 40 letters. simply count the letters, divide by 40, and multiply by $6. Round up to the nearest multiple of $6 Minimum charge $12.

Please Note: We reserve the right to place Market Place ads throughout the main body of the magazine at our discretion, if space does not permit

Closing date :

Ads may be accepted up to the 10th of the month, two months prior to issue date.

payment: Payment must be in advance by cheque, money order or credit card, include your name, address, credit card detail number and expiry date. Faxes accepted. emails accepted to: bbaker@fpc.com.au Payment should be sent with your advertisement, to:

The Advertising Production Manager
Electronics Australia,
P.O. Box 199, Alexandria, NSW 1435
Fax (02) 9353 0997

FOR SALE

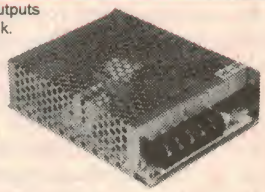
EA Issues Nov 1972 to May 1985 for Sale plus: DS Q1280 Oscilliscope 75mm round CRT. Signal bandwidth DC 5Mhz. In box never used, manual, probes and book 99 ways to use your scope. 2 old radios plus some valves. Offers please to BOb (02) 9622 2358 anytime.

Electronics For Beginners Courses Including DC & AC principles & operational amplifiers.
Enquiries phone: 02 9130 7988

Workbooks For Sale
Electronics for Beginners
Stage 1 DC Electrical Principles
Stage 2 AC Electrical Principles & Operational Amplifiers
Enquiries ph: 02 9130 7988

SWITCH MODE PS

Single thru quad outputs
Huge range in stock.
5V - 48V models available.



Computronics
Corporation Ltd
6 Sarich Way, Technology Park, Bentley, WA, 6102
Ph. 08 9470 1177 Fax 08 9470 2844
Specifications at **www.computronics.com.au**

DAVICAD PTY LTD

Analogue/Digital Designs, Firmware, CAD Services and PC based Applications
From concept to the finished product, rescue of never ending designs or update of existing designs. Reliable, Affordable and On Time Services
Phone/Fax: (02) 9858 1085 obristw@dot.net.au
50 Cobham Ave, West Ryde NSW 2114
http://www.itech.com.au/davicad

Jaycar ELECTRONICS

We are always looking for enthusiastic staff for positions in our Retail Stores & Head Office at Rhodes in Sydney. A genuine interest in Electronics is a necessity.
PHONE 02 9743 5222
for current vacancies

ACETRONICS 02 9743 9235

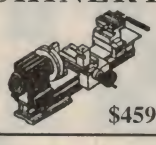
SERVICE-QUALITY-BEST PRICE-FAST TURNAROUND-SS-DSP-TH-MULTILAYER-FLEXIBLE-V GROOVE-
acetronics@acetronics.com.au
PCB'S

WANTED

Wanted: W.W.11, Ex-MIL. Comm. Equip. Type A-Mk. 11 + 111, also Type 3 Mk. 11, (B2) suitcase sets or part sets, command TX/RX and MCR1RX. Pay top money. Ray VK4FH Phone: 07 3299 3819. P.O. Box 5263 Daisy Hill QLD. 4127.

DSP Articles on CDROM
Thousands of articles on CDROM about Digital Signal Processing and applications
Causal Productions Pty Ltd
Ph. 08 8295 8200 Fax: 08 8295 8299
http://www.causal.on.net

TAIG MACHINERY
59 Gilmore Crescent
GARRAN ACT 2065
Fax: (02) 6285 2763
Mobile: 015 269 742
Micro Lathe $459.00



FOR SALE
Audio services business + 25ac. property.
South Coast business established 20 yrs. Run from 25ac. bush property. Lge. 3-4 bed. stone house. Lge workshop. Huge stock of parts. $220,000
Ph 02 44742985

INDUSTRIAL ELECTRONIC SERVICE
custom design to production, prototyping repairs to electronic equipment + power supplies
CAMPAD ELECTRONICS
PO BOX 269 CAPALABA QLD 4157
ph (07) 3245 2008 fax (07) 3823 3428

MicroZed Computers PARALLAX
Entire Genuine STAMP rang stocked
With support gear from other suppliers too
V (02) 6772 2777 F(02) 6772 8987
http://www.microzed.com.au PO Box 634 Armidale NSW 2350

Subscribe to
Electronics Australia
& Save $'s
See page 91 for more details.

Vintage Radio

(Continued from page 50)

Another example

Let's have a look at another example, an Astor model GPS of 1955 vintage. This was a transformerless model intended for AC or DC operation, and has battery reactivation facilities. The circuit is shown in Fig.3.

The AC mains is half-wave rectified by one of the new selenium rectifiers. Then follows a heavy duty resistor to adjust for the incoming mains voltage. Now we get to the reactivation, which is applied here with forward polarity, not reverse polarity as it's supposed to be.

Audio feedback is applied from the speaker voice coil to the bottom of the volume control, via the 39kΩ and 0.03uF capacitor combination. AGC also appears to be applied to only the RF stage and the mixer.

As with the Kriesler circuit of Fig.2, you will see an elaborate series of resistors (400 ohms to 1000 ohms) either shunting the valve filaments, or returning to earth, often with a bypass capacitor. It seems that this was deemed necessary for two reasons. One was to compensate for the cathode current, or the amount of current drawn from the cathode by the anode (a whole 2 - 3mA!) The old 2V valves worked well enough without these additional components, of course.

The other reason given was that with the newer types of valve there was the possibility of unwanted interstage coupling via the filament network. This potentially led to instability, hence the inclusion of compensating and filtering in the filament network.

The Astor GPS model just described was purchased, along with two others, one of which is shown in Fig.4, for a hefty fee of $2.00. It was purchased with the intention of wrecking it for the small power transformer that was presumed to be inside. After opening it up and replacing three electrolytics, it was plugged in and now works like a charm. The case was also flawless, so now it graces the collection as one of the less popular radios.

For anyone starting out in vintage radio collecting, purchasing a radio for $1.00 that works is not a bad move. These sets may not be popular collectors' items, but they're a cheap way to get experience and quick results! ❖

Notes & Errata

Sony DVP-S525D DVD Player Review (August 1999):
The contact number for Sony's Customer Infoline was incorrect. The correct number is (02) 9878 9712. Electronics Australia apologises to all parties concerned.

PC-Driven Video Text Overlay Module (August 1999):
Resistor R13, the DC emitter load for Q1, should have a value of 180 ohms rather than 1k, to prevent sync pulse distortion. In some cases R1 and R2 may need to be changed to 3.3k and 1.8k respectively, to restrict the range of 'character' preset level pot RV1. With some PC printer ports, it may be necessary to add 1K pullup resistors from pins 10 and 12 of IC2 to the DVdd (+5V) rail, to ensure correct handshaking.

Screecher Car Alarm Mk2 (January 1999): When using the alarm with a normally-high door switch system (connects to ground when a door is opened), LED1 may glow slightly when the unit is switched off. If so, there's probably a small current flowing from the lamp circuit to the alarm's V+ line via R2 (when using IN1) and U1a's input protection diode.
The simple cure here is to connect the car's lamp circuit to the alarm input (IN1) via an isolating diode, with its cathode (-ve) end connected to the lamp circuit.

The Mains Monitor (June 1999):
There are a couple of differences between the schematic diagram (page 42) and the PCB layout, as shown in the component overlay diagram (page 44). Each selector switch in SW1 is connected in series with a diode (D2-9), but the switch/diode order is reversed in the schematic. Also, the input pin numbers for U3a's are swapped around, since on the PCB, pin 13 in fact connects to the accept/reject line while pin 12 links to pin 10 of U3c.
These differences are functionally the same, so both the circuit description and PCB layout are quite valid. The unit can be assembled using the component overlay diagram as normal, but you'll need to be aware of the inconsistencies if faultfinding is needed.❖

Electronics Australia **is one of the longest-running technical magazines in the world. We started as *Wireless Weekly* in August 1922 and became *Radio and Hobbies in Australia* in April 1939. The title was changed to *Radio, Television and Hobbies* in February 1955 and finally, to *Electronics Australia* in April 1965. Here are some interesting items from past issues:**

50 years ago

October 1949

Recording Standards Battle: Columbia 33-1/3rpm long-playing records have been on the American market for some months, and are competing with the RCA 45rpm records for popularity. Information from various sources indicates that the Columbia records are winning out, despite an intensified campaign by RCA for the market.

Latest convert to the 33-1/3rpm standard in America is the Decca company, which this month is expected to announce its first pressings at the lower speed. The inference is that RCA will be left on a limb to push its own system unaided.

The 33-1/3rpm records have 224 grooves per inch compared with 96 per inch for conventional 78rpm recordings.

Television Tenders: Our remarks in last month's issue on the Government's action in calling for television tenders before announcing its standards, present a point of view in which apparently we are not alone.

The position has if anything been aggravated by statements from Government sources, that AWA would naturally be the obvious company to play a large part in manufacturing the equipment.

25 years ago

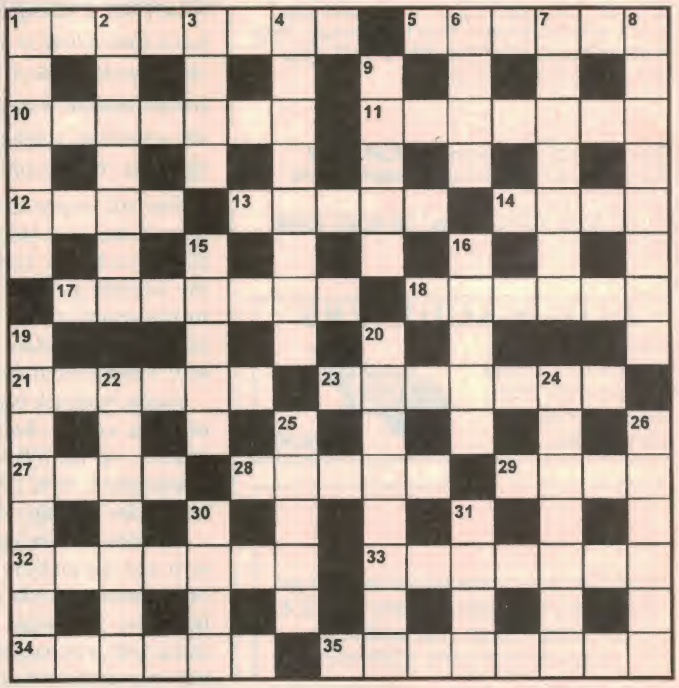
October 1974

Quartz Crystal Watch has LCD readout: A new range of solid state digital watches with liquid crystal displays has recently been introduced to Australia. Designated the 'Minipet Exetron' the new watches have no moving parts. They are timed by a 32,768Hz quartz crystal operating in conjunction with a single CMOS integrated circuit performing the required frequency divisions. The unit is powered by a 1.5V silver oxide cell which lasts for approximately one year.

UHF TV Transmissions Within Five Years: A first step towards the future of some television services in the UHF band has been taken by the Australian Broadcasting Control Board, which has determined the channelling arrangements for UHF television. The arrangements have the support of representatives of the Australian television industry who were consulted on the question, and envisage 22 new channels numbered 28-32 and 39-68, in the frequency bands 526-582MHz and 614-814MHz respectively. They will supplement the existing 13 channels in the VHF band.

The Board has not, as yet, authorised any broadcasting services in the UHF band, but anticipates the need to do so for new types of services — possibly in about five years' time. ❖

Crossword



Across

1 This capacitor is solid, but variable. (8)
5 Contributing element. (6)
10 Light vehicle. (7)
11 Construct again. (7)
12 Prefix indicating light. (4)
13 Moving part of a generator or motor. (5)
14 Australian Technical Analysts Association. (1,1,1,1)
17 Series of fine lines. (7)
18 Prefix indicating three-dimensionality. (6)
21 Scientist noted for 'bell and saliva' experiment. (6)
23 Pilot. (7)
27 One motion of vessel on waves. (4)
28 Memory. (5)
29 Form loops. (4)
32 Device that pulls. (7)
33 Howling. (7)
34 One in charge of parish. (6)
35 Choke. (8)

Down

1 Word in phonetic alphabet. (6)
2 Nuclear activity occurs within it. (7)
3 Winding. (4)
4 Departing forth. (8)
6 Abbreviated. (4)
7 Uncommon magnetic memory element. (7)
8 Device emitting EM. (8)
9 Elementary gas. (5)
15 Sharpening implement. (5)
16 Intermediate in power production. (5)
19 User of radio transmitter. (8)
20 Invert. (8)
22 Said of chemically produced current. (7)
24 An electron acceptor in certain reactions. (7)
25 Lightning can occur in this. (5)
26 Supervises a publication. (6)
30 Engineer noted for I-C cycle. (4)
31 GMT is .... time. (4) ❖

September's solution:

V	I	D	E	O	P	H	O	N	E		D	E	C	K
I		E		A				I		E		X		I
B	R	E	A	K	U	P		T	R	U	M	P	E	T
R		P		S		I		R		P		A		E
A	S	S	Y		M	E	G	A	P	H	O	N	E	
P		E		S		Z		T		O		D		H
H	E	A	D	P	H	O	N	E		N	A	S	T	Y
O				O				P			I			D
N	I	G	H	T		A	N	N	O	U	N	C	E	R
E		R		W		D		I		M		A		O
	T	E	L	E	P	H	O	N	E		B	L	I	P
S		N		L		E		E		L		Y		H
M	E	A	N	D	E	R		S	C	O	R	P	I	O
O		D		S		E				O		S		N
G	R	E	Y		G	R	A	M	O	P	H	O	N	E

Electronics Australia's

Professional Electronics

Test & Measurement feature:

Wavetek's frequency counter ships with rubidium timebase

Mini Virtual Instrument from Emona Instruments

Reviews of LAN Tester, Digital SPL meter

Datataker offers integral display, and logs 40 analogue channels with 15-bit resolution

Disturbance Analyser from Westek spots unwanted 'clicks' in four RF channels, for use in EMC testing.

NEWS

HIGHLIGHTS

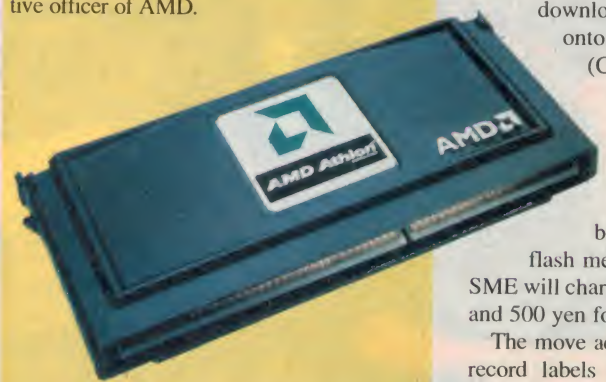
These sail-shaped solar arrays are part of an experimental power project in Mecklenburg-Western Pomerania, Eastern Germany. Designed primarily for export, the arrays will form part of a facility generating 11,000kW of solar power energy. (IN-Press photo)

Intel achieves 600MHz...

Intel's latest addition to its Pentium III line-up is its fastest yet: the new Pentium III 600MHz processor has over 9.5 million transistors and 512KB of L2 cache. Intel also announced its latest Celeron running at 500MHz, available now for US$167. This compares favourably with the PIII 600MHz for US$669.

...While AMD hit 650MHz

AMD have announced their 650MHz Athlon Processor, The Fastest, Most Powerful x86 CPU currently available. "With this announcement, AMD has made history: we've delivered the first seventh-generation processor family, featuring the industry's most advanced microarchitecture and enabling the most powerful x86 platform solution on the planet" said W.J. Sanders III, chairman and chief executive officer of AMD.



Sony to sell music over the Net

Sony Music Entertainment Japan (SME), in its largest endorsement of online music distribution to date, will begin selling music downloads over the Internet by year-end.

SME, Japan's largest record company and a unit of Sony Corp., will offer its own artists' music for sale from December, according to Yasushi Ide, senior director at Tokyo-based SME. The planned service will offer copy-protected music that can be downloaded to a PC and then copied onto a Mini Disc player, CD-R (CD-recordable) disks or a yet-to-be-announced product called the Memory Stick Walkman. The Memory Stick Walkman is a diminutive handheld playback device based on a Sony flash memory card. It is expected that SME will charge between 200 yen (US$1.70) and 500 yen for each song downloaded.

The move adds Sony to the growing list of record labels that are carefully embracing online music sales. The spread of a file compression format called MP3 (Moving Picture Experts Group, Audio Layer 3), which makes it easy to download and replay music, has cut into music CD sales and is forcing record labels to seriously investigate online music sales.

Ide said that Sony might use the MP3 format, but he added that since it doesn't have copy protection "there is a chance we'll use a different format." (IDG)

Siemens breaks world record 3.2 Tbit/s data rate

Siemens developers achieved a new world record for optical data transmission. In the Transport System Laboratories belonging to the Siemens Information and Communication Networks Group in Munich, transmission rates of 3.2 Tbits/s via a single optical fibre were demonstrated using WDM technology (Wavelength Division Multiplexing).

During the demonstration 80 channels, each 40 Gbit/s, were transmitted error-free over 40km long optical fibres simultaneously. The 40 Gbit/s channels were generated using ETDM (Electronic Time Division Multiplexing) developed by Siemens. This technology made it possible to transmit at

the highest global data rate via a single optical fibre. With a 3.2 Tbit/s capacity 50 million simultaneous conversations or 100 million typed pages per second can be transmitted via a single optical fibre. The 40G/System will be demonstrated at Telecom 99 in Geneva.

New CD-PROM Technology from Kodak

Whether publishing computer games or music or software, almost any firm that sells a product on CD may benefit from the new CD-PROM technology, a breakthrough disc format introduced today by Eastman Kodak Company.

The new Kodak discs combine mass replicated CD-ROM content with a recordable area for adding customized information. "From piracy protection to lower distribution costs to personalisation of CD-ROM content, Kodak CD-PROM technology offers enormous value to many businesses that currently publish information on CD-ROM," said Cheryl Bianchi, Kodak's worldwide category manager for digital and applied imaging.

Embedded in the technology are two ways to discourage piracy of software, music and other copyrighted content. One key is a signature code, unique to CD-PROM discs. This code can't be copied over to a CD-Recordable (CD-R) or CD-Rewritable (CD-RW) disc. It is also very difficult to locate or change. The 120mm hybrid disc allows multi-session recording and has a capacity of 680 MB. The space devoted to premastered and recordable information can vary based on the needs of the application.

The technology uses modulated grooves that have the appearance of pits (like CD-ROM discs) and grooves (like CD-R discs) so that the disc can have a pre-stamped area and be appendable for writing. Kodak employs a stabilised cyanine dye across the disc. A gold reflective layer is used for the optimal combination of stability and reflectivity, enabling the reader to read the "pits" through the dye layer and a writer to write to the disc.

Protel goes public

Protel International Limited, a leading producer of desktop electronic design automation (EDA) software for the Microsoft Windows environment, headquartered in Sydney, Australia, announced today that the company has successfully completed its initial public offering on the Australian stock market. Subsequent to the offering, shares of the company have been listed on the Australian Stock Exchange ("ASX") under the symbol PRI.

The float prospectus raised gross proceeds of AUD$46.5 million based on an initial offering price of AUD$2.00 per share. The capital raised will be used by the company to continue its aggressive expansion, to supplement working capital and meet its proportion of the expenses of the offer. This should enable it to further establish its position as a leading supplier of desktop EDA software for the Microsoft Windows platform.

Athlon faces Japan's small space challenge

Executives at AMD Japan this week indicated that some obstacles are likely to face Advanced Micro Devices' new Athlon processor in Japan, but were adamant that selling the chip would be much easier than when the chip vendor first tried to promote its products here.

"It used to be that customers in Japan feared Intel," said Shun Yoshizawa, director of AMD Japan speaking earlier this week. "Two years ago, when we came to see vendors, things were very difficult."

Key to sales of the new processor, though, will be shrinking the "footprint," or the size of the base, of Athlon-equipped desktops, said Yoshizawa. He said that to build Athlon-equipped desktops small enough for the Japanese market, the processor needs to be mounted on a shrunk-down motherboard. "We are talking to Taiwanese OEMs about building the Athlon onto motherboards with smaller form factors. In the U.S. you can have big desktops, but in Japan it must just be an LCD screen and a small desktop," Yoshizawa said. (IDG)

Western Digital to cut 2,500 staff In Singapore

Disk drive manufacturer Western Digital today announced plans to move its volume manufacturing from Singapore to Malaysia, which will result in the loss of 2,500 jobs at its Chai Chee plant in Singapore between now and December.

Western Digital will turn its Singapore manufacturing plant into a regional technical and manufacturing support centre, the company said in a statement.

The California-based company plans to speed consolidation of its high-volume, desktop hard drive production at its Kuala Lumpur, Malaysia facility to improve manufacturing efficiencies and reduce costs, Western Digital said. It will also focus its Singapore production resources on to desktop hard drive development and component qualification, and on to producing high-end Western Digital Enterprise hard drives. (IDG) ❖

P.C.B. Makers!

If you need:

- P.C.B. High Speed Drill
- P.C.B. Material - Negative or Positive acting
- Light Box - Single or Double Sided, Large or Small
- Etch tank - Bubble or Circulating, Large or Small
- Electronic Components and Equipment for TAFEs, Colleges and Schools
- FREE ADVICE ON ANY OF OUR PRODUCTS FROM DEDICATED PEOPLE WITH HANDS-ON EXPERIENCE
- Prompt and Economical Delivery

NEW

Circom/3M Scotchmark white polyester + polyester aluminum foil lined label material, for laser printers.

KALEX

40 Wallis Ave, East Ivanhoe, Victoria 3079

Ph: (03) 9497 3422

Fax: (03) 9499 2381

ALL MAJOR CREDIT CARDS ACCEPTED

ALTRONICS

overnight delivery

Jack O'Donnell, Managing Director

✔ **Yes!** We can supply OVERNIGHT*! PHONE *TOLL FREE 1-800 999 007*

✔ **Yes!** We do offer a NO RISK 14 DAY MONEY BACK GUARANTEE**!

✔ **Yes!** We give 12 MONTHS WARRANTY*** MINIMUM ON ALL PRODUCTS!

✔ **Yes!** We do ACCEPT ALL MAJOR CREDIT CARDS!

✔ **Yes!** We can offer TECHNICAL DETAILS ON ALL PRODUCTS ADVERTISED HERE!

Serving the electronics industry for over **25** *Years*

5 Port 10 Base-T Ethernet Hub

NO MORE NETWORK HEADACHES!

The reliable star configuration of this hub will allow you to interconnect up to 5 computers or more safely. If one link is broken, the remaining still work

Be Quick, Limited Stocks!

D 4300 Was $99, NOW **$79**

DC-DC CONVERTER

Converts 24V DC to 13.8V DC for use with stereos, CB radios, two ways etc. Ideal for trucks, boats, tractors etc.

Features: • Overload & over-current protection • 8A cont. / 10A peak • On / Off power switch • Fused • Extremely compact and rugged • Quality construction

M 8162 **$69**

19 Range DMM

Small on size, BIG ON FEATURES!

Great for the trades person on the move, or for a student lab kit. Includes continuity buzzer, 'K' type thermocouple, and square wave test signal output. Measures DC Volts to 1000V, DC Amps to 10A, AC Volts to 750V, resistance to 2MΩ and temperature from -20°C to 1370°C. It even includes a diode test function!

Q 1051 Was $29.95, NOW JUST **$20**

Q 1054 Carry Case ONLY $5

Includes Temperature Probe & Thermocouple for Measurements up to 1400°C!

Multi-Function Car Alarm

Protect your valuable vehicle with this fully featured, compact car security system offering the latest anti-scan, code hopping, technology.

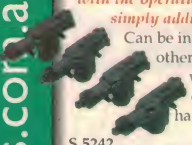
Features: • Multi-function remote • Shock sensor • Starter immobiliser • Valet mode • Selectable auto arming • LED Status indicator and a myriad of user programmable options. (Refer to our 1999/2000 Catalogue for more details)

S 5202 **$179**

Central Door Locking

All four doors will automatically lock & unlock with the operation of either of the front doors by simply adding this kit!

Can be interfaced to our S 5202 car alarm (and others) to lock or unlock all four doors when the alarm is remotely armed or disarmed. Includes all mounting hardware (Refer to our 1999/2000 Catalogue for more details) Suits 12V negative earth systems.



S 5242 **$59.95**

AMAZING OFFER

ADD CENTRAL DOOR LOCKING FOR JUST $20.

(LIMITED TO FIRST 50 CALLERS)

*Purchase the S 5202 Multi-Function Car Alarm and you can buy the S 5242 for just $20...

CD-Rs

Premium quality Kodak CD-Rs in jewel case.

D 0240 Was $4.95, **$4.50** ea, **$3.95** ea 10+

Beware of cheaper inferior quality products that are prone to failure.

CPU COOLING FAN

Avoid the costly expense of replacing your CPU because the fan on it stopped! This integrated fan and heatsink will suit 386/486/686 & Pentium CPUs. Featuring a ball bearing race for long life, the fan simply wires inline via the loop lead supplied.

F 2010 **$9.50**

PC KEYBOARD

Ergonomically designed keyboard, suitable for IBM® compatible computers. Features: • 104 keys • 5 pin connector • 1.5M lead & Microsoft® Windows® compatible.

D 2100 **$29.95**

CCD Surveillance Cameras

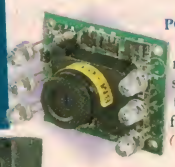
All models feature: • Composite video output suitable for direct connection to the video input on a VCR, Monitor or an AV transmitter. The addition of an RF modulator can also allow the camera to connect to the antenna input of a TV or VCR • Simple 3 wire connection • 500 x 582 pixels • 380 lines • 12V DC Operation

Miniature Cameras in Diecast swivel mounting housing. 2 models available. Surveillance only (S 9000). The other model includes a microphone for audio (S 9005). Supplied with in-line BNC connectors for video and a DC Jack for powering the unit, the S 9005 also has an RCA connector for audio output. *Requires regulated supply. (M 9516)*

...shop surveillance systems, door monitors, video intercoms, reversing monitor for large vehicles, and security or safety applications.

S 9000 B&W RRP **$99**

S 9005 B&W + Audio RRP **$109**



PCB & Lens Cameras. Using only a 3 wire connection, these mini cameras can be installed so they are virtually undetectable. 3 models to choose from. *Requires regulated supply. (M 9516)*

Regulated Supply for CCD Cameras M 9516 **$28.95**

S 9010 B&W RRP **$99**

S 9030 B&W with IR RRP **$109**

S 9020 B&W Pin Hole RRP **$99**

AV UTP TRANSCEIVER

This compact unit will allow the transmission of AV signal from a camera for up to 2,000 feet over standard UTP cable (Cat 5). A single BNC connector is provided for the Video (RCA - BNC adaptor included) and a stereo RCA connector for audio. It's very simple, just plug in the UTP cable and it is ready to transmit.

S 9250 RRP **$89.95** ea

Note: A separate unit is required for transmitting and receiving.

Features: • Only requires 4 connections • Will work up to 2,000 feet • Compact design • No power required • BNC-RCA adaptor included

Power Supply for Life!

0 to 30V @ 5A

A lab supply with a main output rail adjustable from 0 to 30V, at up to 5A.

SAVE $40 M 8205 Normally $329, SPECIAL INTRODUCTORY OFFER **$289**

Features: • Separate controls for voltage and current limiting • Fixed 12V and 5V output rails, at up to 1A peak • Precision digital LCD Voltage and Current Meters for fine adjustment for use in research labs, instrumentation testing, digital circuits, etc.

4 Way AV Switcher

Monitor up to 4 A/V channels with this advanced automatic A/V switcher. Any combination of the four cameras can be scanned and displayed on either of the two monitors, it switches both video and audio. The time and date is displayed on both monitors making it ideal for surveillance applications. The scan rate and duration of each camera can be configured using the on screen menu functions.

SCOOP PURCHASE Hurry, we have 20pcs ONLY with a bonus REMOTE CONTROL included FREE!

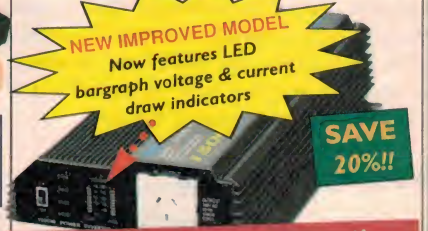
S 9200 **$199**

1500W Inverter

This inverter provides up to a massive 1500W of 240V power from a heavy duty 12VDC car or truck battery.

Features: • Over temperature & overload shutdown • Auto fan cooling • Low battery warning & shutdown • Heavy duty leads • LED bargraphs • Weighs only 3.6kgs

M 8140B Was $995, NOW **$795**



NEW IMPROVED MODEL Now features LED bargraph voltage & current draw indicators

SAVE 20%!!

Massive 1500 Watts Output!

Ideal for Remote Home Power Systems. Will Power a wide range of appliances, including Fluoro Lights & Microwave ovens.

DIGITAL Panel Meter

This 3.5 digit LCD voltmeter will add style to any project. 200mV, 2,20,200 and 1000V DC ranges and decimal place options are easily set by PCB links. Compact, reliable and includes a plastic surround for a professional finish. Requires 9V DC supply.

Q 0560 Normally $45, NOW **$25** or **$20** each 5+

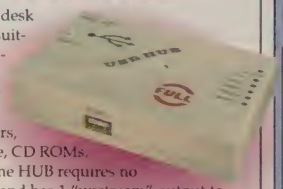
on-line ordering: www.altronics.com.au • fax orders: (08) 9328 3487

1-800 999 007 Perth (08) 9328 1599

12 months minimum warranty*

ALTRONICS

5 Port USB Hub



This tiny 5 port desk mount HUB is suitable for connecting all your peripherals. For instance modems, printers, keyboards, mice, CD ROMs, Scanners, etc. The HUB requires no external power and has 1 "upstream" output to connect to your computer and 5 "downstream" inputs for device connections.

D 4500 **$99**

Programmable Remote Control

This *learning* remote control is very simple to program and operate. It can replace up to eight remote controls plus add up to 20 one-touch macro functions for armchair comfort. *Features:* • 10 Different Appliance Modes with 47 functions per appliance • Smart backlighting (light sensor equipped) • Batteries included

Multi-Function DMM

32 Range

Featuring an extra large display, this multi-function meter hosts numerous functions including transistor tester, capacitance up to 20µF, resistance up to 200MΩ, continuity/diode test, temperature measurement (including thermocouples), massive 20A DC current range and frequency counter up to 20kHz.

Q 1066 Normally $89.95,

INTRODUCTORY OFFER **$69.95**

INCLUDES FREE BONUS RUBBER HOLSTER

Sealed Lead-Acid Battery Charger

Keep your batteries in tip top condition with this "set and forget" charger.

Fully automatic operation, charges at up to 300mA maximum. Once the battery is fully charged, it switches to trickle. Features bi-colour LED for easy monitoring.

Great for use in security systems, fire alarms, monitoring systems.etc.

M 8520 **$29.95**

A 1002 **$129**

1.5A Regulated Supply

Delivering a constant 1.5A at 3V,4.5V, 6V, 7.5V, 9V and 12V, the output voltage varies only minimally from full load to no load making it ideal for voltage sensitive devices like portable TV sets, video games, tape recorders, radios, scanners, computers.

SAVE 20%! Includes Short Circuit, Thermal & Overload Protection!

M 8230 Was $49, NOW **$39.95**

12V Lead Acid Cells

Premium grade long life. Sealed lead acid batteries. **Ideally suited for security alarm panels.**

	Was	NOW
S 5075 1.2Ah	$24.95	**$19.95**
S 5080 3Ah	$32.50	**$24.95**
S 5090 7Ah	$39.95	**$34.95**

Premium Grade Batteries Save $$$ Over Our Competitors!

Tool Case

This quality aluminium tool case measures 460 x 325 x 150mm.

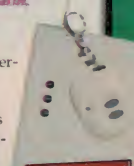
Features all aluminium side panels, unlike others around which have plastic panels!

T 5020 Tool Case **$65***

*Tools pictured in box not included

BONUS OFFER
FREE T 2193 8pc Insulated Screwdriver Set with every T 5020 purchased. (Valued at $16.95)

UHF Remote Control Switch



This little gadget can easily be used to create a simple panic alarm, remote lighting control or to control any item you may wish to operate remotely.

Operates in 3 modes: • **On/Off** The contacts are switched alternately, • **Momentary** The contacts are held closed while the button is held down in the momentary mode. • **Panic** The button must be held down for 2 seconds to operate the relays and also trip the transistor output. *Features:* • Latching/Non-latching Contacts • 2 Relay & 1 Transistor Outputs • Code Hopping • Audible confirmation • Incorporates handy key ring • 387 billion combinations • 30m operating range (open area) • 24 V DC 1 Amp contacts

Ideal for controlling your lights, garage doors, etc

A 1018 Was $110, NOW ONLY **$99**

A 1019 Spare Remote RRP $44.95

Micron DIGITAL Soldering Station

Precision soldering is now at hand!

The new advanced T 2438 soldering station has arrived. Loaded with many sought after features, with care, this soldering station will last a lifetime!

Features: • Japanese ceramic 60W heating element • ±2% precision • Dual mode LED display (switch between tip or preset temperature) • Heater insulation of over 100MΩ • Zero voltage switching • 200° to 500°C temperature range • Ergonomic design • Slide out cleaning tray • Grounding point for ESD protection • 2 Year Warranty • Temperature calibration adjustment • Set and lock temperature setting - using the allen key provided, the temperature setting maybe locked to a specific setting • *Supplied with Long-Lasting Iron Clad Tip*

Ideal for schools, production lines, workbench, R&D departments, etc.

T 2438 Normally $239, INTRODUCTORY OFFER **$225**

120W Gas Soldering Iron Kit

SOLDERING GRUNT TO GO!!

"This has all the convenience features of a normal gas iron, such as quick heating, no power cords, light weight and best of all, it comes with a blow torch tip."

Silicon Chip Magazine, Sept '97

The T 2601 kit comprises of the *T 2600* Gas Soldering Iron PLUS a handy carry case with a range of tips and accessories including cleaning sponge, solder dispenser, blow torch, hot air blower and hot knife cutter.

WHY PAY $200 OR MORE for a 17cc tank size when you can have 33cc for only $129!

MASSIVE 120W Heat capacity! Simple "thumb-start" piezo ignition refillable gas storage!

T 2601 Normally $149, NOW **$129**

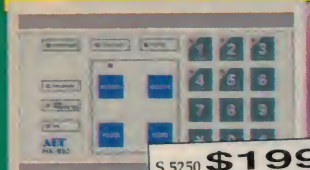
FOR THIS MONTH ONLY The first 100 callers to order the T 2601 will receive a T 2490 Blow Torch to put in their pocket absolutely FREE. (Valued at RRP $24.95)

Professional 4 Sector Alarm System AEI

WHY PAY AN ALARM COMPANY, WHEN YOU CAN INSTALL THIS SYSTEM IN ONLY A FEW HOURS AND SAVE YOURSELF A FORTUNE!

Protect your home and family with this fully featured *quality* alarm system. Easy installation and programming makes this a perfect choice for the novice and professionals alike.

*DON'T TAKE OUR WORD FOR IT, TRY IT YOURSELF AND IF YOU ARE NOT TOTALLY SATISFIED, SIMPLY RETURN IT FOR A FULL REFUND WITHIN 14 DAYS!"**



S 5250 **$199**

M 9672 12VDC Plugpack **$22.50**

Features: • Compact unit can fits into standard 3 gang wallbox or surface mount • Programmable Master code, Client Code and 8 user codes • All user codes are equipped with Duress Function • 4 Zones, Programmable for Instant, Delay 1 or 2, Silent Alert • All zones can be configured for single or multiple triggering • Full memory of alarm events • Programmable entry / exit delay and alarm duration • Programmable response time for each zone • Exit/ entry beep enable / disable options • Instant arming codes for home or away options • Provision for arm / disarm with up to 3 remote keyswitches • Connection for remote Siren, Strobe • 12V DC Operation • 12 months warranty

Super Pack

Normal Value Approximately $110

Pack comprises of:

1 x S 6125 12V Siren
1 x M 9664 12V DC plugpack
1 x S 5305 PIR detector
1 x 50m W 2346 4 core cable
2 x S 5400 Large warning stickers
1 x S 5153 Door reed switch
1 x 30m W 2095 fig 8 cable

S 5252 Super Pack **$80**

Save $30

Mobile Hard Drive Bays

Includes built-in Cooling Fan!

Need to transfer large amounts of data between two locations or do you require a multi-purpose slot in your case?

Features Power & HDD activity LED display, fan cooling. Great for 3.5" hard disk drives, ZIPs, LS-120, DATs.etc.

D 5510 SCSI Was $45, NOW **$27.95**

NiCad & NiMh Battery Charger / Discharger

This SMART charger automatically discharges and then charges either NiCad or Nickel Metal Hydride batteries, prolonging battery life.

Suitable for AAA, AA, C, D & 9V batteries.

** Batteries shown in unit not included.*

A 0288 **$39.95**

SUPER B...
Every purchase of the A 0288 will receive 4 x S 4715 'D' Size NiCad Batteries FREE (Valued at $29)

on-line ordering: www.altronics.com.au • www.orderline.com (08) 9328 3487

Perth (08) 9328 1599 **1-800 999 007**

ALTRONICS

14 day money back guarantee*

on-line ordering: www.altronics.com.au • fax order line (08) 9328 2487

NEW KITS

AV TRANSMITTER

(SC July '99) Excellent for surveillance cameras or to simply reticulate AV around the home. See website for full details.

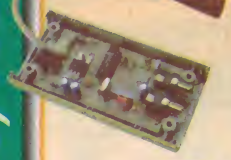
K 5865 **$59.95**

PC MONITOR TESTER

(SC Aug. '99) Pattern generator for testing EGA/VGA/MGA and composite monitors. See website for full details.

K 2720 **$69.95**

VIDEO TITLE GENERATOR



(EA Oct '99) Add titles to your home videos or surveillance video tapes. See website for full details.

K 5878 **$75**

SUB BASS PROCESSOR

(EA Sept '99) Maximize your active subwoofer with this equaliser. See website for full details.

K 5568 **$27.95**

140W Mini Inverter

This amazing inverter provides up to 140W of 240V AC power from your car cigarette lighter socket! During our evaluations, it ran our entire A/V room setup, including a huge 68cm television and A/V amp! Can power televisions, VCR's, lights, Phone and Camcorder battery chargers, shavers and hi-fi systems. Features low battery indicator and overload shutdown. Built-in 3-pin plug (no adaptor required). Includes car cigarette lighter socket lead.

M 8110 ~~$145~~ **$125**

200W Mosfet Amplifier Module

This 200W MOSFET Amplifier module and power supply offers sheer brute power. Fantastic for Active sub woofers, PA systems, Guitar amps, etc.

Features: • 140W RMS into 8Ω / 200W into 4Ω • 300VA toroidal power transformer • Total of 10000µF filter capacitance • Fan forced heatsink cooling • Tough steel base plate

K 5172 Kit Version **$229**

A 1950 Fully Built & Tested **$329**

BEWARE
of inferior products which use cheap transformers rated at the same output power as the amplifier. Remember amplifier power supplies are only 50% efficient!

Infra-Red Doorbeam

This IR doorbeam is suitable for both security systems or as a door minder. Can accommodate up to 5m doorways. Wide operating voltage range (11-20V DC) the sensor can be flush or surface mounted (standard single gang mounting block). N.C. and N.O. contacts are provided to either connect to an alarm system or to trigger a buzzer (S 6110) as a simple door minder.

S 5330 Normally $109, INTRODUCTORY PRICE **$99**

M 9660 12V DC 300mA RRP$13.50 Plugpack to suit

S 6110 12V DC RRP$4.65 Piezo buzzer to suit

SAVE OVER 30% ON KITS

STEREO FM TRANSMITTER

(SC Oct '88) Listen to your favourite CD on your FM radio while you work around the home. See page 212 of 1999/2000 catalogue

K 1120 WAS $32, NOW ONLY **$22**

AUDIO CABLE TESTER (EA Nov '97)

Avoid time consuming fault finding by testing the integrity of your wiring in a flash with this versatile audio cable tester. See page 203 of 1999/2000 catalogue.

K 2567 WAS $29.95, NOW ONLY **$19.95**

CABLE BREAK LOCATOR

(EA Feb. '98) Find the break in your cable within ± 20% of the break location. See page 203 of 1999/2000 catalogue.

K 2571 WAS $39.95, NOW ONLY **$29.95**

DUAL TRACKING SUPPLY

(SC Jan. '88) 1.2 to 18V @ 1.7A, perfect for beginners or as a test bench supply.
See page 200 of 1999/2000 catalogue.

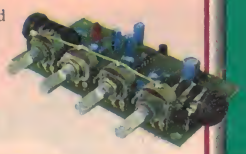
K 3325 WAS $99, NOW ONLY **$69**

HI ENERGY IGNITION

(SC Jun. '98) Keep your motor firing on all cylinders every time and improve your fuel efficiency to boot!
See page 205 of 1999/2000 catalogue.

K 4020 WAS $49, NOW ONLY **$35**

MIC COMPRESSOR & EFFECTS UNIT



(SC Mar. '99) Mic or guitar compressor and effects unit all rolled into a miniature unit. See website for full details.

K 5525 WAS $29.95, NOW ONLY **$19.95**

40W FLURO INVERTER

(SC Nov. '93) Fantastic for mobile lighting applications, just add the fluro and your in business.
See page 200 of 1999/2000 catalogue.

K 6370 WAS $69,

NOW ONLY **$49**

Mipro 16 Channel VHF Diversity

Here is your chance to take advantage of a fantastic offer and save hundreds of dollars on a premium studio quality VHF diversity microphone system. Featuring 16 channels, ergonomic design and simply outstanding performance these systems will give years of hassle free service.

50% OFF!
NO THIS IS NOT A MIS-PRINT!
ONLY 20PCS LEFT, BE QUICK!
YOUR CHOICE OF HANDHELD OR LAPEL TRANSMITTER

Great deal for bands, churches, groups, sporting clubs, schools, etc. Includes 16 different frequencies which can be selected on site. This is ideal if you encounter interference you simply dial up another frequency!

C 8777 Transmitter & Receiver Complete
Was $1260,

NOW ONLY **$630** per system

(Your choice of handheld or lapel transmitter)

ALTRONICS
174 Roe St. Perth W.A. 6000
Phone (08) 9328 1599, Fax (08) 9328 3487
MAIL ORDERS C/- P.O. Box 8350
Perth Business Centre, W.A. 6849

American Express Cards Welcome · We welcome ... bankcard · MasterCard · VISA · Diners Club International

****No Risk 14 Day Money Back Guarantee:** If you are dissatisfied with our goods for any reason, please return to our premises within 14 days of our despatch date and we will refund your purchase in full, less transport costs. All items must in *NEW* condition.

*****1 year minimum warranty:** 12 months from date of supply. Goods becoming faulty in this period should be returned to our premises with evidence of purchase and $6 money order, cheque or stamps to cover return postage.

Standard Delivery & Packing Charge: $5.00 to 500gms, $6.00 500gms-1 kg, $9.00 1kg-5kg. Where possible we process your order the day received and despatch via Australia Post. Allow approx 9 days from day you post order to when you receive goods.

***Overnight Jetservice:** Up to 3kg is $9.50, 3kg to 5kg is $16.00—We will process your order the day received (if placed before 2.00PM WST) and despatched for delivery the next day. Country areas please allow an additional 24-48 hours.

Heavy Service: All orders of 10kgs or more must travel Express Road—Please allow up to 7 days for delivery. $12.00 to 10kgs. $15.00 over 10kgs. **Insurance:** As with virtually every other Australian supplier, we send goods at consignee's risk. Should you require insurance cover against loss or damage please add $1.00 per $100 of order value (minimum charge $1). When phone ordering please request "Insurance". **Altronics Resellers:** Chances are there is an Altronics Reseller right near you—check our catalogue, phone us for details of the nearest dealer. An up to date reseller listing is available at our internet site at www.altronics.com.au 24 hours a day.

1-800 999 007 Perth (08) 9328 1599

Sound Level Meters go digital

Just how loud *is* loud? Does the noise in your workplace exceed industrial standards? Does the racket from your kids or your neighbour's jet-powered lawnmower pose a health threat? You can answer these questions (and many more) with a standard handheld sound level meter, but a digital version makes the job even easier.

BY ROB EWANS

While multimeters changed over from an analogue to digital readout many years ago, it seems to have taken a very long time for low-cost sound level meters to catch up. The two instruments are quite similar in many ways, with each featuring an input stage, a multi-range attenuator section and a final readout, so there seems no real reason why sound meters couldn't have gone through the same metamorphosis as low cost multimeters. It may have something to do with sales volumes, market forces and other nebulous factors way beyond mere technical aspects, of course...

Jaycar have come to the party though, and are now offering a neat digital sound pressure level (SPL) meter for $169, which includes all of the easy-to-use features you'd hope from a digital-style instrument. It has a large 35 x 45mm LCD display, auto-ranging over four 30dB ranges, a maximum level hold function, plus an automatic maximum/minimum recording feature.

All of these features make Jaycar's digital version a snap to use, particularly when compared to the equivalent analogue instrument based on a moving-coil meter. Gone are the days of squinting at small meter-scale markings while trying to mentally record the maximum needle deflection — with the digital meter, it's just a case of hitting the 'max hold' button and letting the auto-ranging do its thing.

What's the catch though? None really. It's a little more expensive than the mechanical meter types, and you can't take the last digit (tenths of a dB) too seriously since the unit's stated accuracy is +/-2dB. This level of performance is typical of SPL meters in this price bracket however, which is fine for general sound level measurements and comparative testing.

It *is* very easy to use, and this is undoubtedly the Jaycar meter's strongpoint. The LCD features a large (13mm) 3.5 digit readout plus a pseudo-analogue bargraph calibrated in 1dB steps (covering the current 30dB range), with both the absolute and relative readings visible at a considerable distance. Also, the current settings (range, A/C weighting, etc) and modes (max hold, etc) are reported around the edges of the LCD, so you only need to take a quick glance at the screen to pick up both the reading and the unit's current status.

The meter powers-up in a sensible configuration, so first-time users can make meaningful noise level measurements from the word go, while the automatic features (scale ranging and power shutoff) can be overridden via the front panel buttons. It's hardly a complicated test instrument of course, but the well thought out LCD/button interface makes it very easy to drive.

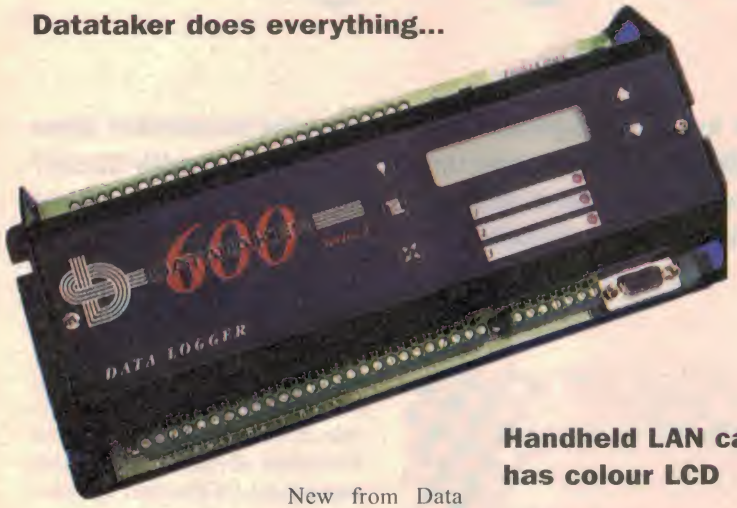
As a real-world test, we took the meter out and about in inner-suburban Sydney for a series of noise level measurements, where it was forced to deal with the change between a (relatively quiet) domestic environment and the cacophony of overhead aircraft plus the infamous traffic noise of Paramatta road — reportedly Australia's busiest section of tar. The meter coped well with this large dynamic range while busily cycling through its ranges as expected, and the maximum and minimum level features were able to deliver quick readings without the need for fussy operator adjustments.

And the winner in the maximum noise stakes? Both the low-flying 747 Jumbo jets and Paramatta road's 36-wheel trucks were beaten at the post by six year-old Max, who's boisterous enthusiasm for his latest Lego creation delivered the highest SPL figure of all. So much for domestic peace and harmony...❖

Digital Sound Level meter (Jaycar Cat# QM-1590)

Good points: *Very easy to use. Large, clear readout.*
Bad points: *Not super accurate, but typical of SPL meters in this price bracket.*
RRP: $169
Available: *Jaycar Electronics stores. See their catalogue, or check the Jaycar website:* ***www.jaycar.com.au***

Datataker does everything...



New from Data Electronics is the Datataker DT600 data logger. The DT600 is the latest in the range of sophisticated data acquisition and recording devices, designed to operate in almost any environment, independent of a host computer.

Although known as 'data loggers', Datatakers do much more than just log or record data. They can be configured to acquire data from sensors, Log the measurements in internal memory (or removable memory card for later recovery), and apply sensor calibrations, including scale factors, spans and polynomials. Measurements can then be converted to other units (voltage to degrees for example) and carry out statistical and other calculations on the measurements (average, standard deviation, maximum, minimum) all in real time, and without needing a host computer.

The Datataker DT600 stand-alone battery-powered data logger offers universal channel support, and uncomplicated, flexible, powerful programming options. It contains an integral display, 10 differential and 30 single-ended analog channels, 4 digital channels (input or output), three high speed digital counter channels, and the ability to sample volts, current, 4-20mA, resistance, frequency and period, as well as 11 types of thermocouples, RTDs, bridges and strain gauges with a 15bit (1μV) resolution.

Its internal memory can retain 13,650 readings, while a removable PCMCIA memory card will increase this to 340,000 measurments. It contains an internal battery, has a low power (sleep) mode, and fits into a powder-coated steel case, 270 x 110 x 85mm.

While the preview sample arrived too late for a comprehensive review in this issue, We intend to put it through its paces in next month's issue. If you can't wait until then, contact Data Electronics on (613) 9764 8600, or see their web site at **www.datataker.com.**

Handheld LAN cable tester has colour LCD

The new Hewlett-Packard Wirescope 350 is claimed as the industry's first handheld tester equipped with a colour touch screen. It allows cabling contractors and IS managers to certify commercial cabling infrastructure to current and emerging LAN performance standards.

The HP Wirescope 350 provides a 350MHz test frequency range and measurement accuracy beyond the draft TAI level III specification, exceeding the expected requirements for Category 6/Class E cable certification testing. The user interface features a large colour touch screen for simplified menu navigation and improved results comprehension. Colour diagrams highlight fault sources, and cabling colour codes are designed to improve operator efficiency and reduce training requirements.

The instrument is also claimed as the industry's only cable tester to use removable CompactFlash memory cards, to provide virtually unlimited storage of test results with detailed plot data. Such data allows users to re-evaluate saved test results against new performance standards without needing expensive re-testing of the actual cable runs.

The HP Wirescope 350 is expected to become available by Q3, through authorised HP Wirescope distributors and resellers worldwide. The US price for the Wirescope 350 test kit is $5995. For more information **visit www.wirescope.com.**

Frequency counter has rubidium timebase

Wavetek's new 905 and 905R frequency counters are designed for on-site frequency calibration in ATE systems and calibration labs. Both models fulfill the requirements for calibrating cellular telephone base station master clocks, with a very short warm-up period of less than 10 minutes. The counters are very user-friendly, and feature a smart automatic input trigger control, plus an on-screen signal strength indicator to guide the user. Both models offer high resolution of 10 digits at one-second measuring time, and DC-300MHz standard bandwidth (up to 2.7GHz optional).

The model 905R features a built-in Rubidium frequency reference, and maintains a 50x margin to base station master clock frequency accuracy specifications for 10 years without adjustment. The lower-cost model 905 can be equipped with a high stability square-cut oven crystal oscillator option.

Both models are portable and intended for field as well as bench-top use. Traditional counters cannot be transported to a different location without a continuous battery back-up. The optional oven in model 905 is designed around the more advanced square-cut crystal oscillator with virtually no retrace, and a very short warm-up period — making a battery obsolete for portable or transportable applications.

The counters are built to handle a wide variety of measurements including continuous waves, non-repetitive events, radar bursts, TV signals, pulse trains and many other complex waveforms, with or without the use of external synchronization signals (external arming). In systems or GPIB-cluster applications, the 100% programmable 905/905R can measure and store up to 1600 frequencies.

For more information contact Wavetek Wandel Goltermann, 42 Clarendon Street, South Melbourne 3205 or visit **www.wavetek.com**.

Disturbance analyser

The AFJCL55C is a discontinuous disturbances ('click') analyser compliant with the new, mandatory CISPR 16 (AS/NZS 1052) and CISPR 14 (AS/NZS 1044) standards. It fully supports thorough investigations regarding when, where and why clicks occur.

The main purpose of a click analyser is to recognise and count all clicks (short, long, continuous noise and switching operations from the device under test), and to store all numeric and graphic data. This is done by an RF receiver sampling simultaneously the peak and quasi-peak levels of four frequency-specific channels. The AFJ CL55C is therefore an essential item in testing compliance to EMC emission standards for a wide range of domestic and industrial electrical goods.

The CL55C is a four-parallel-channel fixed frequency (150kHz, 500kHz, 1.4MHz and 30MHz) receiver, with each channel provided with peak and quasi-peak detectors that are fully compliant with Clause 2 of CISPR16-1. The quasi-peak detectors are designed to automatically perform tests in full compliance with the requirements of EN55014, which specifies an oscilloscope for time-domain operation.

Pre-compliance, self testing is made simple through the use of a built-in impulse generator that can produce the entire set of single and multiple disturbance pulses, in the various timing and shift configurations, as required by Clause 14, Tables 14,15 and 15 of CISPR 16-1.

Powerful and user-friendly control software permits the running of standard and customised tests, in a very easy and fully automatic way.

For more information contact Westek Industrial Products, Unit 2, 6-10 Maria Street, Laverton North 3026 or phone (03) 9369 8802.

PCI/PXI signal generator cards

National Instruments has announced three new signal generators to its line of computer-based instruments. The new NI 5431, NI 5411, and NI 5401 signal sources deliver analog stimuli for network analysis, video signal testing, automotive testing waveforms, and serial signals for the test and diagnostics of serial communication links.

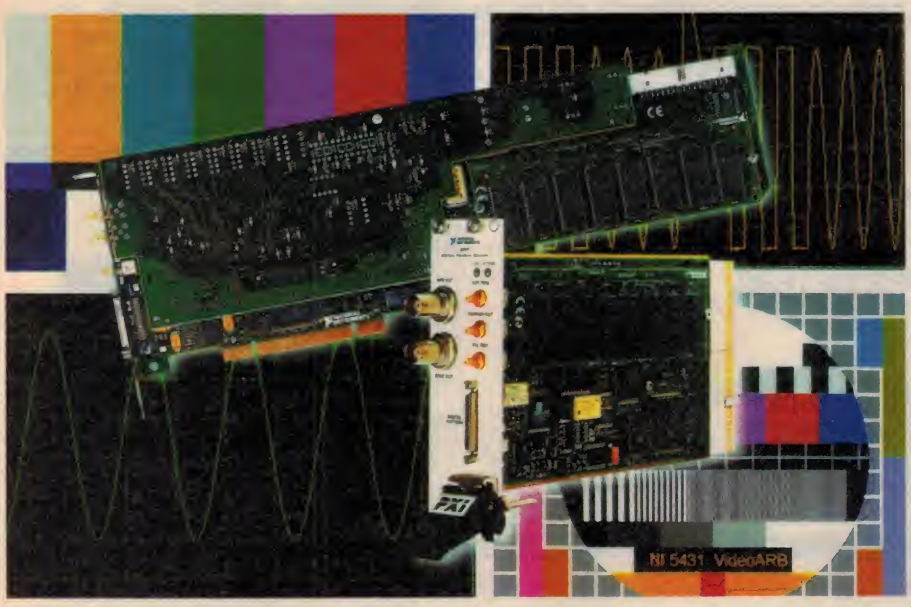
Rivalling the performance of stand-alone and VXI-based signal generators, the new signal sources leverage the flexibility and benefits of standard computers, including Pentium processing and deep high-speed data storage, making them the most capable signal generators available.

The NI 5431 for PCI and PXI/Compact/PCI computers is a high-accuracy analog and digital video signal generator supporting M-NTSC, B/G-PAL, M-PAL, N-PAL, and SECAM standards. It features a sampling frequency of 20MHz, adjustable in the range of 20.00 - 20.01MHz to support the chroma frequency of different formats. Additional features include 12-bit vertical resolution, a 16-bit digital pattern output (four bits can be used as external synchronisation signals Csync, Hsync, Vsync and Field), 2MS (expandable to 8MS) of waveform memory, a 32-bit DDS for up to 16MHz frequency generation and 50Ω/75Ω selectable output impedance.

The NI 5411 is a full-featured arbitrary waveform generator for PCI, PXI/CompactPCI and ISA computers. With no compromise in performance or ease of use, the NI 5411 includes all the functionality of arbitrary waveform generators, sweep generators, and function generators. Features include 40MS/s sustained waveform generation; 12-bit vertical resolution; 2MS (expandable to 8MS) of waveform memory; and +/-5V or +/-10V output.

The low-cost NI5401 is a DDS-based function generator for PCI and PXI/Compact/PCI computers. As a low-cost signal generation solution, it can generate repetitive signals such as sine, square, triangular and limited arbitrary with a minimum upper frequency of 9.31MHz. Additional features include 40MS/s update rate, 12-bit resolution, +/-5V or +/-10V output and 50Ω/75Ω selectable output impedance.

For more information contact National Instruments Australia, PO Box 466, Ringwood 3134 or visit **www.natinst.com**.



Infrared thermometer with laser sighting

The Fluke 65 is the first non-contact, laser sighted, stand-alone thermometer designed by Fluke to complement its existing temperature product offering. Created to meet the needs of electrical, process, plant maintenance, facility maintenance, HV AC/R and automotive professionals, the instrument cuts

temperature measurement response time to less than one second, effectively decreasing the time to troubleshoot and fix problems.

The instrument features a laser beam for easy aiming and is claimed ideal for measuring rotating, electrically live, dangerously hot or hard-to-reach objects. It is also a handy alternative to a contact thermometer. It provides an accurate response in 0.8 seconds with the high-

ly repeatable temperature readings from -40°C to 500°C (-40°F to 932°F). Even in the dark, users will find its backlit display easy to read.

The dual-display screen allows easy scrolling through the MIN/MAX variation measurements. Other features include temperature memory, any key wake-up, 0.1° resolution up to 200° and 8:1 optical resolution. The bright laser target beam provides a reference point for objects being measured.

Measuring only 63 x 41 x 184mm, the instrument is small, light and ergonomically designed for easy storage.

For more information contact Fluke Australia on (02) 8850 3333, or visit **www.fluke.com**.

Mobile phone testers

The new Wavetek 4400 series is claimed as a universal platform for digital communications. In addition to outstanding measurement accuracy the instruments can cut the time required to test a mobile phone by up to 50% using new measurement techniques.

The instruments can currently be used for tests supporting all forms of GSM technology (GSM900, GSM1800, GSM1900 and dual-band mobiles). Other digital communications for mobile phones, such as cdmaOne are planned for the near future, making the 4400 series a truly universal testing platform. Initially there will be two versions of the series: the 440M for production and the 4400S for high level servicing.

The Wavetek 4400 has an inbuilt PC, and standard PC accessories such as a keyboard, mouse and monitor can be directly connected. Two PCMCIA slots provide extraordinary flexibility, as standard PCMCIA cards for modem operation or LAN connection are supported. Serial and parallel interfaces allow direct control of the test mobile or other auxiliary devices.

Another powerful feature is RAPID!, which allows automated testing for different mobiles. RAPID! Test scripts, using an extended form of BASIC language, can simply be customised with the internal editor and stored on floppy or internal hard disk.

For more information contact Wavetek

LEADER TEST & MEASUREMENT INSTRUMENTS

- CD/Mini Disc LASER POWER METERS
- OSCILLOSCOPES
- SIGNAL GENERATORS
- VECTORSCOPES & WAVEFORM MONITORS
- NEW DIGITAL EQUIPMENT AND MORE .....

CALL for your Free Catalogue!

10 mW Laser Power Meters

2 YEAR WARRANTY WITH ANY PURCHASE THIS MONTH ONLY

STANTRON AUSTRALIA Ph: (02) 9894-2377 Fax: (02) 9894-2386 Email: stantron@internet-australia.com

Wandel Goltermann, 42 Clarendon Street, South Melbourne 3205, or visit **www.wavetek.com**.

High accuracy handheld DMMs

The new Fluke 89 Series IV are claimed to represent the next generation of powerful and accurate handheld digital multimeters. The meters boast 0.025% accuracy and 50,000 counts of resolution, on a multiple reading display that includes a real-time clock, enhancing troubleshooting with the ability to correlate time of day with events. Users will also enjoy the unprecedented speed that these meters provide — turn the meter on and it's ready for operation instantly.

The Fluke 89 Series IV can store up to 1000 measurements in stand-alone operation, allowing a user to log data based on events, time, or manually. All measurements are available for later viewing on the meter's display.

The multimeter provides additional functionality with the optional FlukeView Forms software, enabling the user to maximize the logging capability by using templates to create custom reports. FlukeView Forms software is ideal for documenting test procedures for new equipment installation, meeting the demands of a regulating agency or tracking maintenance histories.

The 89-IV series measure volts, ohms, amps and capacitance, as well as temperature in °C and °F, continuity, and have a diode test function. The ergonomic case design houses a multiple reading display for simultaneous readouts, such as true RMS AC+DC and Hertz, dB and mV DC, and more. In addition to relative mode and Min/Max/Average, they offer a 250us Fast Min Max for capturing peak transients.

A closed-case calibration feature allows calibration adjustments to be made directly from the front panel or through the infrared port.

For more information contact Fluke Australia on (02) 8850 3333, or visit **www.fluke.com**.❖

dataTaker

NEW DT800

"Keeping an eye on reality"

dataTaker

Data Acquisition, Data Logging, Data Recording, SCADA, RTU

The DT800 is a fast universal data acquisition and logging box for laboratory, remote and industrial applications. Key features include:

- Ethernet, USB and RS232 standard
- PC Card socket for FLASH & Modem
- Very low power stand alone operation
- Storage for 700,000 readings
- Sampling to 100KHz
- 0.02% accuracy, 18bit resolution
- Wide –45°C to +70°C operation
- Easy to use bundled software

The *dataTaker* DT800 is able to interface with the widest range of sensors without any additional options.

dataTaker Pty. Ltd.

www.datataker.com

PH: (03) 9764 8600

AD-0112

CIE

NEW! FREE! Multimeter Selection Guide

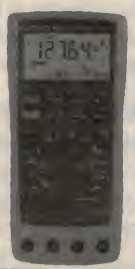
Call Us Before You Buy!

Combines Quality, Performance & Value for Money

Instruments for every application :

- Digital Multimeters
- Thermometers
- Current Clamps, mA to 1000A's ac/dc
- H. V. Probes
- Sound Level Meters
- IR Temperature Probes
- Industrial
- Automotive etc

Whatever you want to measure we have an instrument to suit your budget. We distribute the leading brands including Fluke, Pantec and CIE. Most meters are supplied with safety test leads, spare fuses (where applicable) and holsters or cases. They are available from selected electrical and electronic distributors or visit our trade counter.



Ultimate Hand Helds from Fluke!
Look at these NEW Features...

87 MkIV offers ac+dc coupling, dBm and dBV, 50,000 count, temperature etc.

89 MkIV adds RS232 interface/software.

Call for full details and pricing.

FLUKE

Call us for FREE brochures and unbiased advice on the best meter for your application!

OBIAT PTY LTD

129 Queen Street, Beaconsfield.
P.O.Box 37 Beaconsfield NSW 2014

Any prices quoted are ex-tax
ACN : 003 166 952

Tel : (02) 9698 4111 Fax : (02) 9699 9170

Call for name of your local stockist http://www.obiat.com.au

SOLID STATE Update

LATEST DEVELOPMENTS IN SEMICONDUCTOR TECHNOLOGY

Level-shifted MOSFET load switches

Vishay Siliconix has released three new level-shifted load switches, each of which allows a low-voltage microcontroller to control loads on a range of different voltage rails. The new Little Foot TSOP-6 devices include higher-performance versions of competing parts, while introducing the first device of this type with a 1.8V operating voltage, the Si3865DV.

Designed to facilitate multiple rail voltages in cell phones and portable computers, all three load switches set on-resistance records for this device type, with $r_{DS(on)}$ as low as 80mΩ when switching 4.5V loads. In addition to prolonging battery life, the new devices feature integrated N-channel level-shift circuitry that saves space by eliminating the need for an external MOSFET to give a true ground referenced low-voltage logic input. Only a resistor is needed for a complete solution.

The devices offer designers a choice of operating voltages to suit the headroom needs of various systems. The N-channel component of each device can be driven by logic signals as low as 1.5V and features internal ESD protection up to 3000V.

The devices also provide an adjustable slew-rate feature which allows designers to avoid the effects of surge currents that could affect microcontroller or battery monitor operation if loads are turned on too quickly.

For more information contact Vishay Siliconix, 2201 Laurelwood Road, Santa Clara CA 95054-1595 or visit the web site at **www.siliconix.com**.

Dual version of fast 3V, 8-bit ADC

Analog Devices has released the AD9288, a dual version of the AD9283 which at 100MS/s is the industry's fastest 8-bit analog-to-digital converter (ADC) to operate at 3V. Like its single-channel predecessor, the AD9288 contains on-board track-and-hold circuits and separate encode clocks, allowing maximum design flexibility for many applications. In addition, the AD9288 requires no external reference or driver components, for cost-sensitive system designs.

The low power requirement (110mW with an input frequency of 10.3MHz at 100MS/s per channel), single-supply operation, and outstanding dynamic performance make the AD9288 particularly well suited for dual-channel communications applications such as those requiring matched I and Q channel processing. The two channels of the AD9288 can also be operated separately, making it useful in battery powered applications such as handheld wireless equipment and low-cost digital oscilloscopes.

The part is available from stock in three speed grades: 40MS/s, 80MS/s and 100MS/s.

For more information contact Analog Devices, Suite 4/1621 Point Nepean Road, West Rosebud 3940, or visit **www.analog.com/fastadcs**.

First quad 16-bit D-to-A converter

Burr-Brown's new DAC7644 is a quad 16-bit DAC featuring low power, low cost and small size. These features are said to make it well suited for automatic test equipment, valve drivers, data acquisition systems, closed-loop servo control, DAC-per-pin programmers and motor control applications.

The voltage output DAC7644 offers unipolar or bipolar operation, low power (10mW), fast settling time (10us to 0.003%), and guaranteed 15-bit linearity and monotonicity over the -40°C to +85°C temperature range. It accepts 16-bit parallel input data, has double-buffered DAC input logic (allowing simultaneous update of all DACs), provides a readback mode of internal input registers, and can operate from a single +5V supply or from +5V and -5V supplies.

For more information contact Kenelec, 23-25 Redland Drive, Mitcham 3132 or visit **www.kenelec.com.au**.

Smallest 16-bit ADC

Burr-Brown's new ADS8320 is claimed as the industry's smallest 16-bit analog-to-digital converter (ADC). Packaged in an 8-pin MSOP, it is designed specifically for industrial data acquisition and instrumentation systems.

In addition to small package size and high resolution, the ADS8320 requires very little power even when operating at the full sampling rate (1.8mW at 100kHz). At lower conversion rates (10kHz), power dissipation is reduced to less than 0.3mW. The device also features a unique power-down mode which reduces supply current to 3uA max.

Ultra-low power and small size make the

ADS8320 well suited for battery-operated systems, remote data acquisition, simultaneous multi-channel systems, and isolated data acquisition. The ADS8320 is pin-compatible to standard 8-pin, 12-bit ADCs, thus allowing designers to upgrade resolution and performance without costly board layout changes.

The ADS8320 features operation from 2.7V to 5V, synchronous serial (SPI/SSI) interface, low noise (<20uV RMS), and a differential input to reduce noise interference. The reference voltage can be set to any level within the range of 0.5V to Vcc.

For more information contact Kenelec Scientific, 23 Redland Drive, Mitcham 3132 or visit their website at **www.kenelec.com.au**. ❖

A peek at Pico's ADC-42 sampler

It has 12-bit resolution over a +/-5V range, samples at 15kS/s and is the size of a standard DB25 backshell. What's more, It's self-powered and bright red — what more could you ask for. Some decent software to go with it, perhaps? Oh, it has that too...

Well, it's small, and it's red. Quite how they managed to squeeze everything into a DB25 backshell is beyond us...

BY GRAHAM CATTLEY

VIRTUAL INSTRUMENTS, data loggers, digital oscilloscopes, call them what you will, they all boil down to the basic concept of an analogue to digital converter (ADC) connected up to some form of digital storage system - which in most cases is a personal computer. Of course this is an over simplification, but it highlights the fact that the whole idea is to get the data into a digital format where it can be stored, graphed or otherwise analysed.

Now, if you look at the range of commercial samplers available, you'll find millions of them, with an equally huge price tag to match. Which is unfortunate, because nine times out of ten you just want to do something simple — like monitoring a temperature sensor, or plot a battery discharge curve.

Well, you couldn't get much simpler than Pico's range of ADCs. Perhaps the ultimate in no-frills sampling, these tiny devices simply plug into the parallel port on your system, and offer one channel sampling at up to 20kHz. You can run up to three of these colourful little things on the one machine at once (so long as you have enough parallel ports to support them), and because they are self powered, there's no worries about messy plug-packs. They're pretty inexpensive too.

Emona Instruments were kind enough to send us over one of the more well-endowed units, the ADC-42 which offers 12-bit sampling at 15kS/s and a bipolar (+/-5V) input range. Other models are available though, down to 8-bits 0-5V at the slightly higher 20kS/s sampling rate.

Software

With such a simple hardware setup (it took us all of six seconds to plug it into a spare parallel port) a lot is going to rest on the software side of things. Three floppies later, we had both the Windows and DOS applications installed, and were playing around with sampling rates and trying out the various recording methods available in PicoLog - Pico's Windows based data logging application.

The Windows version comes with a comprehensive guided tour, and over a hundred pages of detailed information in the help file as well as a useful list of 'How to' topics. The following is shamelessly lifted from the help file, and lists the some of the many operations you can perform when logging data.

- Collect data at high speed from a single ADC
- Collect data at low speed over long periods from multiple ADCs
- Set alarm thresholds for measured parameters
- Use parameter scaling with equations or lookup table
- Calculate additional parameters from one or more measured parameters
- Analyse files whilst collecting data
- Display data during slow collection
- Display data in graphical (XY and Y vs time) or spreadsheet list style

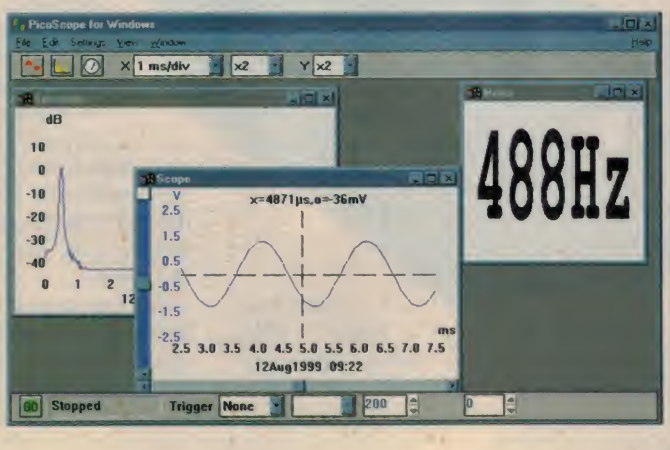
And once you have the data, you can transfer it to other applications via the clipboard, DDE or by file, in a number of useful formats.

Of course the ADC-42 is capable of a lot more than just logging — in the Windows installation you also get PicoScope, which offers a digital volt/dB/frequency meter, spectrum analyser and oscilloscope, and quite importantly, a set of drivers so that you can write your own applications to talk to the ADC.

Last, but by no means least, is the DOS logging software. This is ideal for low-horsepower machines — particularly laptops. Its menu-driven interface is a bit strange, but you soon get the hang of it and it is just as capable as the Windows version.

With this huge amount of software supplied, there is very little you can't do with

(Continued on page 89)



The PicoScope software is quite comprehensive — you get a spectrum analyser, oscilloscope and a volt/frequency/dB meter that can all run simultaneously. There's also PicoLog, which handles long-term data logging as well as analysing the results.

NEW PRODUCTS

Components & Equipment

Highest capacitance 16V NPO ceramic caps

Philips Components' Advanced Ceramics & Modules (AC&M) business group has announced availability of what are claimed as the world's highest capacitance 16V NPO ceramic multilayer capacitors (CMCs). The new devices have been launched in response to growing market demand for ever higher stability and reliability in modern circuit designs.

The company's existing 16V NPO CMC range is being extended to capacitance values formerly available only in X7R dielectric. In the past, the limitation on capacitance value in the highly stable NPO dielectric meant that circuit designers were restricted in their designs to using class 2 X7R products. The availability of these new high-capacitance products with their very low temperature coefficient will give designers greater freedom to develop circuits offering the optimum performance and stability demanded of modern equipment.

The products are initially being introduced in case size 0402 with capacitances from 270pF to 470pF, and in size 0603 in values from 1800pF to 3300pF. Philips plans to extend the capacitance range of its other 16V NPO multilayer series in case sizes 0805 and 1206 before the end of 1999.

For more information visit the Philips AC&M web site at **www.acm.components.philips.com**.

Handy little boxes

Sescom Inc has announced a new series of very compact metal boxes which are claimed as ideal for housing laboratory test fixtures. The new LAB Box-IT enclosure range consists of nine sizes, from 38 x 50 x 19mm (1.5 x 2.0 x 0.75") to 50 x 152 x 38mm (2.0 x 6.0 x 1.5"), with 25 optional pre-punched end panels for popular connectors.

Supplied in flat knock-down form, the enclosures use panels cut from 1mm non-anodised aluminium sheet with precision corner extrusions, and come complete with assembly screws. They are easy to assemble and low in cost — making them very suitable for making test fixtures or very small projects.

To promote the new range, Sescom is offering a free sample of the enclosures. The samples are available by calling, writing, faxing or sending an email, quoting LAB19902. Note that this offer expires on December 20, 1999.

For more information contact Sescom Inc, 2100 Ward Drive, Henderson, NV 89015-4249 USA, fax (702) 565 4828 or email to **sescom@sescom.com**.

In-ear monitor system

Shure Bros has launched a new wireless personal monitor system for touring applications. The PSM700 is a frequency agile system with two groups of 16 selectable UHF channels and a minimum operating range of 300 feet. The system is fully compatible with all other Shure wireless systems, and up to 16 PSM700s, each providing a separate stereo mix, can be operated simultaneously.

Featuring Shure's new E5 universal fit earphones, the PSM700 offers users the choice of stereo, mono and MixMode operation. Exclusive to Shure's PSM series, MixMode provides users with the

Compact 350W inverter

Standard Communications has released the GME Electrophone INV400 DC to AC inverter. Built in Australia and enclosed in a strong black anodised aluminium chassis, the inverter offers advanced protection circuitry to safeguard the inverter itself, the supply battery and the 240V appliance connected to it. Front mounted LEDs and an audible alarm give instant feedback of overtemperature and overload.

The INV400 also has a demand start feature, normally found only on much more expensive and higher wattage units. This feature helps conserve battery power by only starting the inverter when its automatic sensing circuitry detects a load on the 240V output.

With a standard Australian three-pin outlet socket, the INV400 will supply a continuous 350 watts of 240V AC output power and is strong enough to supply 450W for five minutes. Supplied with attached battery leads and backed by GME Electrophone's 12-month warranty, the INV400 makes a great alternative to generators with their accompanying noise and fumes.

For additional information contact Standard Communications at 6 Frank Street, Gladesville 2111 or visit **www.gme.net.au**.

choice of sending and receiving a pair of monaural mixes rather than just a single stereo mix. When the MixMode function is active, the balance control on the PSM receiver can be used to adjust the relative volumes of these two mixes according to individual performance needs.

The E5 earphones are claimed as the first universal fit, dual driver personal monitors on the market. They incorporate proprietary low mass/high energy drivers and provide a secure and comfortable fit while delivering full range performance. They are also available with custom-fit sleeves. A full range of optional accessories is also available.

Shure's PSM700 is distributed by Jands Electronics for an RRP of $7595. For more information contact Jands on (02) 9582 0909.

Portable Sensor Light

Dick Smith Electronics has introduced a new portable sensor light. This movement activated PIR (Passive Infra-red) light switches itself on as someone approaches and off after they leave. Well suited for lighting hallways, children's rooms, stairs, bathrooms, storage, cupboards and sheds without having to find a light switch, it can also be relocated at any time.

The sensor switches the light on automatically using PIR detection in a 90° area and up to six metres distance. It turns off after 15 seconds after the last detected movement. There is no wiring required, making the unit easy to install and user friendly. It can be carried from room to room or wall mounted.

A further feature is that the sensor light

will only operate at night, as the daylight sensor prevents daytime operation — saving battery power.

The device runs from four AA batteries and has the facility for AC mains operation by using an AC power adaptor set on 6V DC (adaptor and batteries are not included).

The Portable Sensor Light is available for an RRP of $27.50 from all Dick Smith Electronics stores Australia-wide, and also Powerhouse stores in Penrith, Bankstown and Moore Park in NSW and Carnegie in Victoria. It can also be purchased via mail order by calling Dick Smith Electronics Direct Link on 1300 366 644. ❖

T&M Product Review

(Continued from page 87)

these samplers. About the only thing to watch out for is the limited bandwidth and that the outer shell of the sampler's BNC connector is connected to the computer's ground, so there is a potential for earth reference problems in some circumstances. Apart from that minor point. I can't fault it. So if you need a spectrum analyser, oscilloscope, volt meter, frequency meter, data logger or even audio sampler, the ADC range from Pico are just the ticket.❖

Pico's ADC-42

Good points: *Small, self-powered, and it's bright red too.*
Bad points: *It's small enough to lose...*
RRP: *$322 (inc tax), down to $200 for the ADC-10.*
Available: *Emona Instruments, 86 Parramatta Rd., Camperdown NSW 2050. Phone: (02) 9519 3933; Fax (02) 9550 1378; Email testinst@emona.com.au; Website:* ***http://www.emona.com.au.***

AUSTRALIAN DISTRIBUTOR

NTE®

Small reels / packs

SMD COMPONENTS

now available

Product listing available on request

Colourview Electronics
PH: (07)3275 3188
FAX: (07)3275 3033
Email: colourv@colourview.com.au
PO Box 228 / 5 Commerce St
Salisbury Qld 4107

New Books

8051 micro programming

PROGRAMMING AND CUSTOMIZING THE 8051 MICROCONTROLLER, by Myke Predko. Published by McGraw-Hill, 1999. Hard covers, 192 x 242mm, 542 pages. ISBN 0-07-134195-1. RRP $95.00.

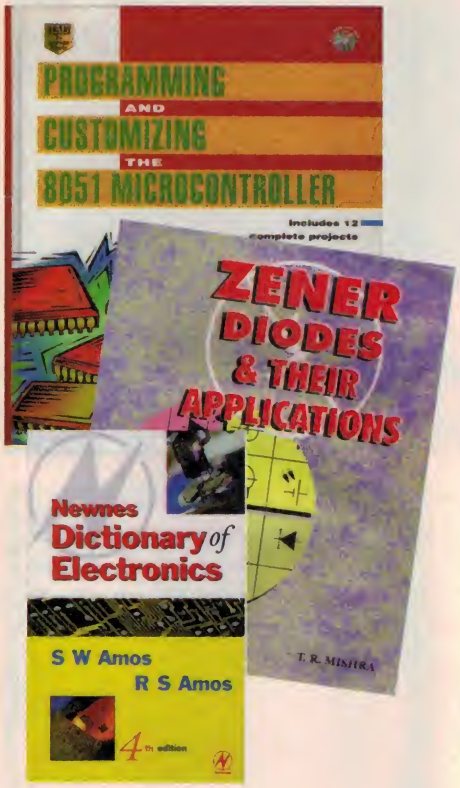
This is an interesting book on Intel's 8051 series of microcontrollers, and one that will leave you fully competent in programming them if you manage to work your way through it. Not that there's anything wrong with the book, or the way in which the information is presented — it's just that there is so much stuff here that it's going to take you a while to get through it all.

Myke has previously written a couple of other books on general microcontroller programming, but this latest effort concentrates solely on the 8051, where he briefly covers the basics of microcontroller architecture and design, before he launches off into a compete rundown on each of the 255 instructions available. Myke pares these down to a mere 62 basic explanations, and also provides a (very welcome) running commentary with code examples showing how and why the various instructions are used.

From there, we head off through timers, interrupts basic I/O and watchdogs, into the heart of the book, where we are shown how to physically program the micro, and what development tools are available. We then get in to 50 or so experiments, which start by lighting a LED, and finish with the design and construction of a Cx051 emulator.

It's all pretty much hands-on, with lots and lots of code scattered throughout the book, and everything presented in a logical easy to follow manner. It is also written (for the most part) in the first person, which is unusual for a book of this calibre. It makes the book very accessible, readable and dare I say it, friendly. It's not all roses though — this book covers everything you need to know on the 8051, and is by necessity, a brief in places. But so what? No one book can cover everything on a subject (although this one tries hard to do so), and if you are into micros then you may well understand a lot of the programming concepts already.

Worthy of mention are the appendices, with such useful things as 16-bit maths and sorting routines and LCD interface programs. It also covers some of the current micro development systems around today, such as the ever popular SimmStick, and includes a CD-ROM with development software, data sheets, and all the code from the book. All up, a worthy addition to your micro-programming bookshelf. (G.C)



Zener reference

ZENER DIODES AND THEIR APPLICATIONS, by T. R. Mishra. Published by Tech Publications, 1998. Soft covers, 182 x 235mm, 184 pages. ISBN 981-214-975-9. RRP $19.95.

It would be easy to disregard this title on first appearances, printed as it is on cheap paper with the odd ink blot thrown in for good measure. But you don't buy this sort of book for its production quality. You buy it for its technical content, and this book sure has loads of that.

Practically everything — no, make that *everything* you need to know about Zener diodes is here, with the first section of the book given over to ratings, characteristics, dynamic impedance and static resistance and just about every other possible parameter you can come up with.

The second section gives over 80 application circuits involving Zeners, including the usual voltage and shunt regulators, followed by series regulators, constant current generators, battery supplies, protection circuits, and even Zener testing circuits.

The appendix contains data for just about all the Zeners that you are likely to encounter, and there's even a listing of suppliers who will sell you a Zener diode — assuming you live in India, that is. Yes, this is an Indian production, and as I said, not of the highest production standard. But if you can put up with the odd blob and smudge, and are willing to follow the somewhat ad hoc circuit symbol conventions, you'll find this book most enlightening. (G.C)

Electronic Dictionary

NEWNESS DICTIONARY OF ELECTRONICS, by S. W & R. S Amos. Published by Butterworth-Heinemann (Newness imprint), 1999. Hard covers, 143 x 222mm, 390 pages. ISBN 0-7506-4331-5. RRP $95.00.

It must be very difficult to compile a dictionary of electronics, particularly when the term 'electronics' encompasses such a wide field these days. Despite the problems in defining this area (or perhaps because of them) this father and son team have come up with a concise and compact dictionary that seems to cover enough, but not too much. You'll find definitions of some computer terms, such as motherboard and MPEG, but not CD-ROM or token ring, for example.

This is actually the fourth edition of the dictionary, with the last edition published back in 1996. While there hasn't been much change in the terms used in the electronics industry since then, there have been significant changes in the computer and data processing fields. So the question is, what do you add to the new edition? Acronyms of course. 16 pages of them, all reasonably up to date, compiled from many sources, and with an emphasis on electronic terms. It is in this section that you'll find CD-ROM — but being an acronym listing, there is no explanation of what a CD-ROM actually is.

But this doesn't detract from the usefulness of the book; you'll be looking in it for a description of the Krell factor, or a concertina phase splitter — electronic terms that this book covers quite well.

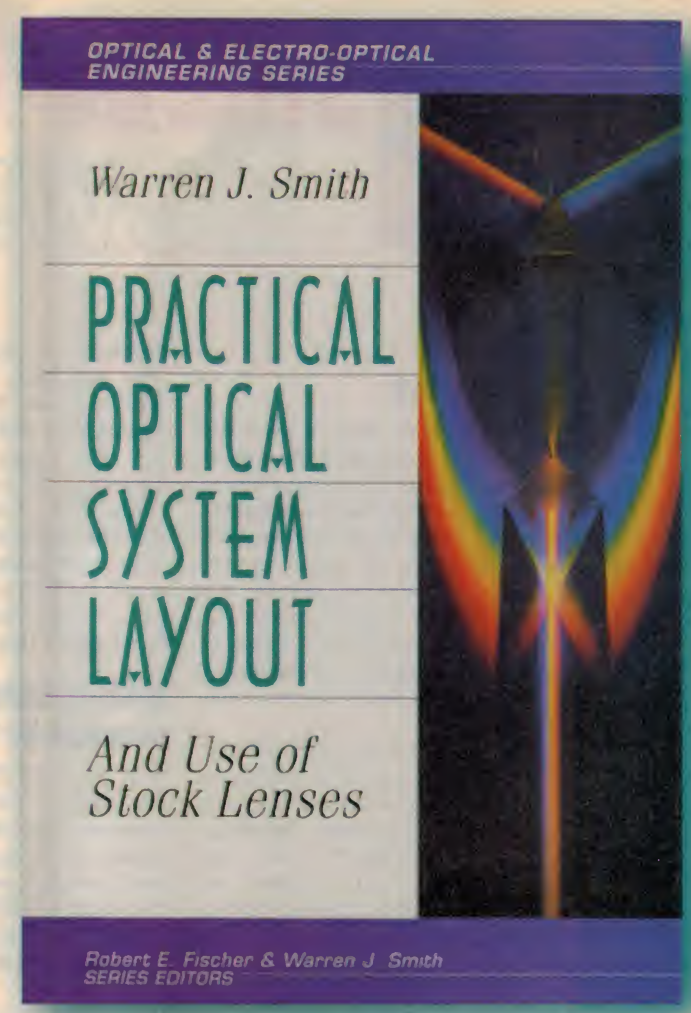
Looking through it, you might be surprised at the length of some of the entries. For example, lasers get a full page covering the many different aspects of producing and using coherent light. These are almost miniature essays on the subject, and tend to be somewhat encyclopedic in nature. Another initially surprising aspect of the book is the number of valve-related terms covered and illustrated. References to various now-obsolete terms and circuit configurations (with diagrams) tend to give the dictionary an old fashioned flavour, but when you think about it, this is exactly the point of the book. If you need to know about a Dynatron oscillator, where else are you going to look? (G.C) ❖

WIN

a copy of Practical Optical System Layout And Use of Stock Lenses

Electronics Australia and McGraw Hill are giving every new and renewing subscriber the chance to win a copy of the informative book "Practical Optical System Layout And Use of Stock Lenses" by Warren J Smith, valued at $173.95 each.

As its title suggests, this book is intended to provide a good practical reference to optical system layout. The emphasis is on how to achieve the desired optical performance, without having to delve too deeply into the theory of optics.



FOR YOUR CHANCE TO WIN:

Simply **subscribe to Electronics Australia** for the discount price of **$55 for 12 issues** (saving you $16.40 on the normal cover price) and you will automatically be placed into the draw to win a copy of "Practical Optical System Layout And Use of Stock Lenses".

Don't delay, as this offer is for a limited time only.

TO SUBSCRIBE:

1300 656 933
- with your credit card details ready (call charged at local call rate)

FAX (02) 9353 0967

Cut out or photocopy this coupon and send to:

Reply Paid No.3 (no stamp required)
FPC Magazines Subscriptions
Locked Bag 1028
Alexandria NSW 1435

POST

CONDITIONS OF ENTRY: 1. The competition is open to Australian residents authorising a new or renewed subscription to Electronics Australia magazine. Employees of IPMG, McGraw Hill Book Company, their subsidiaries and families are not eligible to enter. 2. Prizes are not transferable or exchangeable and may not be converted to cash. 3. The judge's decision is final and no correspondence will be entered into. 4. The competition commences on September 13, 1999 and closes last mail on October 19, 1999. 5. The draw is at the promoter's premises on October 26,1999 at 11am and the winners will be announced in the Public Notices section of the Australian on October 28, 1999, and notified by mail. In the event of any unclaimed or unwanted prize, a second chance draw will be conducted on February 26, 2000 subject to Reg. 37 of the Lottery & Gaming Regulations 1993 (SA). 6. The prize is one of 20 copies of "Practical Optical System Layout And Use of Stock Lenses" valued at $173.95 r.r.p. each. Total prize value $3,479. The promoter is FPC Magazines, 180 Bourke Road, Alexandria NSW 2015. 9. All entries become the property of FPC Magazines, and may be used for future marketing purposes. NSW Permit No: pending; ACT Permit No: pending; NT Permit No: pending; SA Permit No: pending; VIC Permit No: pending.

20 COPIES TO BE WON

VALUED AT $173.95 EACH

YES, I want to subscribe to *Electronics Australia* and go into the draw to win one of 20 copies of Practical Optical System Layout valued at $173.95

☐ **1 year (12 issues) only $55 (save $16.40)**
☐ **2 years (24 issues) only $110 (save $32.80)**

I enclose my cheque/money order for $_____ payable to FPC Magazines
or charge my: ○ Visa ○ Amex ○ Bankcard ○ Mastercard ○ Diners Club

Cardholder's Name: _____ **Expiry Date** ___/___

Card No:

Signature: _____ Date: ___/___/___
(Unsigned orders will not be accepted)

Send to: _____

Street No & Name: _____

Town/Suburb: _____

State: _____ Postcode: _____

Phone: Home (___) _____ Business (___) _____

Email: _____

Payment to accompany subscription coupon - not refundable. Offer open to Australian residents only.
Overseas prices on application (Fax 61 2 9353 0967). ELT – POS 10/99

Offer ends October 19, 1999

Silicon Valley Newsletter

Iridium falters into bankruptcy

THE SATELLITES ON which it relies are still orbiting the earth, but the Iridium company itself has crash-landed as the wireless communications provider filed for bankruptcy in a US court. However the relatively few customers that have so far signed up for Iridium services are not affected by the move, which is largely designed to help the unit stay in business and give it a chance to catch its breath and reorganize. "It's business as usual", said Iridium chief executive John Richardson.

Richardson said that it is a 'great shame' that the organization has come to this point. Not long ago Iridium was seen as one of the world's premier high-tech ventures, promising to provide access to voice and data communications from any point on earth using a US$5 billion communications satellite network.

Iridium filed for bankruptcy after missing scheduled payments on US$3 billion in bank loans and bonds. It also follows a month after Motorola, which conceived the service and is Iridium's largest shareholders, said it could not afford to pour additional resources into the company.

Analysts said they expect the Iridium company to be sold to a large telecommunications conglomerate interested in expanding wireless operations worldwide.

Richardson admitted that while having excelled at every level of engineering, the company has failed to create a market for its services. "Our marketing was inept."

IBM and 3Com link for networking

IBM AND 3COM ARE planning to cross-licence each other's networking and communications patents, in a move that should help each speed new products to market. The deal is reportedly worth about US$1 billion in revenues to IBM over five years.

"The technology advances of IBM's best and brightest researchers are worth a lot to our customers in the communications world. This highlights our strategy to get IBM innovation into the marketplace as quickly as possible", said James Vanderslice, senior VP and group executive for IBM's Technology Group.

IBM and 3Com have enjoyed a long-standing business and technology development relationship. Recently, 3Com said it would use IBM's PowerPC 405GP technology to reduce 'system-on-a-chip' design and development time.

IBM speeds data storage by 1000x

IBM RESEARCHERS AT the company's Almaden research facility in San Jose have announced the development of new data storage technology that promises to increase the way information is stored and retrieved by a factor of 1000, using just half the power of today's storage technologies.

As information is stored in ever greater densities, the speed with which it can be accurately written and read is slowed down. In May IBM set a world record by storing 20 billion bits of information in a square inch, using technology developed at the San Jose lab. The latest advance involves flipping positive and negative charges in a magnetic field 1000 times faster than ever before.

Traditionally, this is accomplished using more power. The IBM researchers have accomplished their amazing performance improvement by emitting a very small burst of power for 2ps (pico seconds) to form a magnetic field. The magnetic field causes the charges to flip spontaneously. "All we do is trigger the reversal, rather than forcing it with more power", said Dieter Weller, a member of the IBM research team.

"The Internet is the big motivator here. There's so much more information people need to store", Weller said. "We were facing a brick wall. Now we understand the physics."

Packard Bell NEC Inc.'s Consumer Division has just released this new all-in-one home computer, badged as the NEC Z1. Sleekly designed, and combining a 15" XGA flat-panel display with cutting edge specs and easy upgradeability, it's already proving very popular. The display will even be upgradeable to 18", later this year. US retail price is US$2499. (Business Wire)

Another Valley icon throws in the towel

WATKINS-JOHNSON, THE Silicon Valley high-tech company that was founded at a time when the Valley's electronics companies chose conventional-sounding names like Hewlett-Packard, Varian Associates and Fairchild Semiconductor, is going out of business. The company has announced it is selling its wireless telecommunications equipment business to Marconi North America, a Rockville, Maryland-based unit of the UK's General Electric Company Plc. Marconi is paying US$57.9 million in cash.

W-J has been hit hard by the three-year recession in the world semiconductor equipment market, where it sells chemical vapour deposition systems. In March the company said it would sell off different product divisions. In May Silicon Valley Group announced it would buy W-J's chip-equipment business for US$83 million.

"We believe these assets will benefit from becoming part of Marconi's business", said Keith Kennedy, Watkins-Johnson's

president and CEO. The group is responsible for 40% of W-J's annual sales.

Following the Marconi deal, the only remaining business at Watkins-Johnson is its microwave products group that makes assemblies for cellular phone towers. The company said that there are several 'interested parties' for that unit.

Via buys IDT's Winchip line

LESS THAN A MONTH after buying the Cyrix microprocessor line from National Semiconductor for US$167 million, Taiwan's Via Technologies has agreed to buy the 'WinChip' microprocessor business unit from Integrated Device Technology. Via and IDT also agreed to a patent cross-license agreement for each other's chip technology.

The move will substantially strengthen Via's rapidly emerging role as a key competitor in the market for low end X86-based microprocessors, especially the chip set market where Via already ranks second only to Intel.

Like National, IDT said last month that the intense competition in the low end market brought on by Intel's Celeron line is forcing the company to retreat from the market.

Apple invests in Samsung's flat panels

IN A MAJOR BOOST for Samsung's flat-panel display operations, Apple Computer announced it is investing $100 million in Samsung Electronics to help the business unit increase its production and cost efficiencies of flat-panel screens, and to ensure a supply for Apple's new notebook computers.

"We are pleased to partner with Samsung to insure that Apple is on the cutting edge of flat panel display technology", said Steve Jobs, Apple's interim CEO. "With our new iBook and fast selling PowerBooks, Apple will need more flat displays than ever going forward."

Analysts said the move shows all the more the renewed confidence at Apple of its long-term prospects. The company has built up a cash reserve of US$3.1 billion and is leveraging some of that with deals such as the Samsung investment.

Fairchild Semi goes public — again

THE LAST TIME anyone could buy shares in Fairchild Semiconductor was in 1979, before the granddaddy of the Silicon Valley semiconductor industry was acquired by Schlumberger. That is until August this year, when the new Fairchild, located in Portland, Maine, raised US$370 million in its initial public offering.

The chipmaker sold 20 million shares at US$18.50 each. The sale represents 23% of the company's shares outstanding and gives the company a market value of US$1.65 billion, more than it has ever been worth. Fairchild was sold in 1997 by National Semiconductor for US$550 million, to a group of investors and Fairchild managers who still retain a 43.4% stake after the offering.

One thing hasn't changed at Fairchild. Just as in the late 1950s, the company's chief rival in the market for specialty circuits is Texas Instruments, although Dallas Semiconductor and Europe's ST Microelectronics are also key competitors.

Despite the successful stock offering, Fairchild faces some problems. It has US$715 million in debts and lost $123.9 million in the fiscal year ended May 30. That compares with net income of $13.4 million, in fiscal 1998. Sales last year fell 6.9% to $735.1 million from $789.2 million.

AMD challenges Intel with 500-650MHz Athlons

FOR THE FIRST TIME Advanced Micro Devices is on top in the microprocessor performance battle with Intel, as the Sunnyvale chipmaker officially launched its new 'Athlon' series of K7 processors, offering significantly higher performance over Intel's Pentium III line. The Athlon chips will let AMD compete head-on with Intel in the high-end desktop and workstation markets. In an important move, IBM and Compaq said they would be shipping PCs based on the new chips.

The first Athon chips come in 500MHz, 550, 600 and even 650MHz varieties. On average, they are 9% faster than competing Intel Pentium II chips. When running complex three-dimensional modelling software, the chips outperform Intel's best by 21%, according to *PC World* magazine.

Athlon is a Greek word signifying strength, power and speed. And cheap! The prices of the Athlon range from US$249 per chip for the 500MHz version to $615 for the 600MHz version and $849 for the 650MHz version. Currently the average selling price of AMD's K6 processors is just US$67, causing AMD to lose money.

Initially, the Athlon chips will be targeted at high-end systems for consumers and small businesses. Next year, AMD says it will target the corporate workstation/server market.

AMD's performance lead is expected to last into the fourth quarter, as Intel doesn't have a 600MHz+ processor scheduled until the launch of the 'Coppermine' chip this fall.

AMD says it plans to produce between one and two million Athlon chips this year, and so far, the word on AMD's manufacturing seems to be good.

In the past, AMD has suffered from manufacturing problems which have caused it to suffer low yields. Industry insiders report that AMD has not run into any major obstacles in producing the Athlon chips as yet. ❖

HP picks 'Agilent' for its T&M spinoff

THE PRODUCTS ON which Hewlett-Packard was founded and built into a multinational high-tech powerhouse were its electronic test and measurement systems and medical equipment. But now those products, having been blamed for HP's slow growth and low profitability, will be sold under the name 'Agilent Technologies', the name of the company HP is spinning off. The new company, introduced during a brief press conference at a San Jose theatre, will have annual sales of US$6 billion and 43,000 employees.

The decision to spin off the non-computer side of the company was announced in March. It was prompted by the company's desire to rid itself of product groups that are capital intensive, low-volume oriented and with relatively low profit margins.

Ironically the name Agilent was chosen as it implies 'agility', a term that doesn't typically apply to the kind of products and markets it will be selling. HP's test & measurement product sales declined 11% in the second quarter to US$991 million, for example, while medical systems sales rose a modest 13% to $398 million.

"We looked at literally thousands of names", said Ned Barnholt, chief executive of H-P's measurement and medical businesses, who also will be CEO of Agilent, which will be based in Palo Alto alongside the new HP company.

If the name Agilent Technologies sounds suspiciously close to Lucent Technologies, the AT&T equipment products spin off, that's perhaps because HP and AT&T used the same branding consultant firm — Landor Associates — to come up with a catchy name for the operation.

Unfortunately for HP, the Agilent.com domain name is already taken, forcing the company to resort to the www.agilent-tech.com domain address. Barnholt said Agilent may try to purchase the Agilent.com domain name from its present owner.

HP has also announced that Agilent Technologies has filed for an initial public offering. The IPO is likely to be one of the biggest in US history. The group represents about 17% of HP's business, which would give it a market value of around US$20 billion.

HP is expected to raise between US$100 and $200 million from the sale of part of its stock holdings in Agilent when the company does go public.

COMPUTER NEWS & New Products

Faster CD-R/RW drive from Kodak

Kodak has announced a new faster version of its popular CD-R/RW drive. The new drive continues to employ Kodak's comprehensive software, which gives users the ability to write data, audio, video CD and hybrid formats, but is now capable of 4x recording on both CD-R and CD-RW media and also has 24x read speed.

The new drive kit is called the Kodak 48041DE CD-R/RW Writer, and is expected to retail for around $500. It uses a standard ATAPI IDE interface, providing user friendliness and powerful functionality in one box. The kit also includes cables and integrated software, which even allows connection to a home hifi system, enabling music recording from any audio source. Also supplied is a personal imaging warehouse package called Gazo, for organising and manipulating images.

Kodak has also expanded its recordable optical media product portfolio by introducing a new silver-alloy CD-R called Kodak Ultima in both 74 and 80 minute versions, and two new DVD products. The new media join Kodak's hugely popular family of CD-R media, including the recently introduced Kodak CD-PROM discs.

Kodak CD-R Ultima is the ultimate in silver-look CD-R discs. The new media is claimed to outlast all other silver-type discs by providing a true 100 year lifetime. Kodak CD-R Ultima media employs an all new patented special silver-alloy reflective layer along with Kodak's renowned pthalocyanine dye, which is claimed to make it more stable and reliable than discs with a 100% silver layer.

400MHz Pentium II notebook from Acer

Acer Computer has announced its latest TravelMate 720 notebook PC, based on an Intel Pentium II processor running at 400MHz. This latest release from Acer's high-end notebook PC stable is claimed to 'up the ante' for desktop replacement players pitching to the corporate market.

A full-featured notebook PC, the Travelmate 720 also incorporates an advanced graphics system and a graphite-based Lithium-Ion battery which is claimed to outlive all others in its class. The machine delivers all the processing, network connectivity, and multimedia benefits of a full-featured corporate desktop PC. A built-in international fax-modem is a standard feature, as well as contributing to reduced ownership costs.

The new TravelMate 720 is priced at $6995 (RRP inc) and comes with a one-year limited local International Traveller's warranty. For more information contact Acer Computer Australia, 5 Figtree Drive, Australia Centre, Homebush Bay 2140 or visit **www.acer.com.au**.

Adaptec's FireWire Products

IEEE-1394, or FireWire, delivers a fast and constant stream of data over thin, flexible cables and can connect up to 63 devices, making it an attractive technology for the convergence of PCs and consumer electronics. FireWire controller chips and host adapters from Adaptec easily bring this new technology to the desktop, enabling new multimedia desktop applications.

Adaptec's HotConnect 8920 kit offers a 1394 connection for transferring digital data and still images between computers and 1394 devices. The Adaptec HotConnect Ultra 8945 kit combines the power of Ultra Wide SCSI with 1394 on a single PCI card and adds software to enable full motion digital video transfer over 1394.

Today consumers can use the kits to move digital images from any 1394-enabled DV camcorder onto their computer, edit the image or video, and then send the image back out over the host adapter, maintaining a completely digital connection. Interfacing via 1394 preserves the quality of DV video by eliminating the process of converting the image or video to analog.

With more diverse 1394 devices on the horizon, such as DVDs, scanners, printers, hard drives, and Device Bay, the HotConnect 1394 kits offer an immediate way to future-proof today's systems with 1394 technology.

The HotConnect 8920 will sell at an RRP of $600 including tax, and HotConnect Ultra 8945 will sell for an RRP of $1350 including tax.

Adaptec's products are distributed by Agate Technology (02) 9870 3600 and Tech Pacific (02) 9381 6000. More information on Adaptec products is also available at **www.adaptec.com**.

Half-size Pentium MMX card

A new Advantech CPU board with a Pentium MMX CPU mounted directly on the card is now available from Priority Electronics. The PCA-6751 features an all-Intel chipset combination, the supply of which Intel has guaranteed for several years (typically five to seven). This all-Intel embedded solution means low power consumption and fan-less operation for temperatures of up to 60°C.

The all-in-one half-size Pentium card includes VGA/LCD, Ethernet and Solid State Disk option. The embedded Intel Pentium MMX CPU can be selected to run at 166MHz or 266MHz. On board is the Intel 430TX chipset, the Intel 100Base-T Ethernet chip and the Intel VGA/LCD chip with 2MB video RAM on chip (C&T 69000). The card features an SSD socket for Compact Flash Disks rang-

ing from 4-40MB.

The PCA-6751 is also available pre-loaded with Windows CE V2.1 on a 10MB Compact Flash Disk.

For more information contact Priority Electronics, 189 Bay Road, Sandringham 3191 or phone (03) 9521 0266.

High performance DAQ board

National Instruments has announced a new high-speed PCI data acquisition (DAQ) board that extends the company's high-performance E-Series product line and delivers more powerful computer-based measurement options to scientists and engineers. The PCI-6052E preserves measurement accuracy, even at high gains or acquisition rates, to provide powerful and precise solutions for data acquisition applications.

The high-speed PCI-6052E features 16-bit resolution and a sampling rate of 333kS/s. The board also offers PCI bus mastering, fast settling time, advanced timing control, and multi-board synchronization capabilities. As with other National Instruments data acquisition products the PCI-6052E integrates seamlessly with NI's easy-to-use application software, including LabVIEW and LabWindows/CVI, so users can rapidly develop powerful and versatile DAQ solutions.

The PCI-6052E provides either 16 single-ended or eight differential input channels, and also features two 16-bit analog outputs, eight TTL digital I/O lines and two 24-bit counter/timers.

For more information contact National Instruments Australia, PO Box 466, Ringwood 3134 or visit **www.natinst.com.au**. ❖

Speakers S/kits & custom designs for Raven & other drivers

SPEAKER DESIGN AND OPTIMIZING SOFTWARE

Distributors for...

● Access ● Cabasse ● Phl ● Audire ● Soundeasy ● Luminous ● Accuton ● Focal ● Triangle ● N.E.W ● Topbox ● Mills ● Axon ● Orca ● Raven ● Chase ● Clio ● Axon accessories

Call or send $5 for catalogue and pricing

W.A.R. AUDIO

Unit 203/396 Scarborough Beach Road, Osbourne Park WA 6017

Ph: 61 8 9242 5538 Fax: 61 8 9445 2579

www.warco.com.au/war@wantree.com.au

ELECTRONIC COMPONENTS

THE BEST PRICES ARE ON THE WEB

www.futurlec.com

large range fast delivery

WHEN small IS BIG NEWS

Introducing the world's first 0402 wirewound inductor

Coilcraft's new 0402CS Series is the latest breakthrough from the company that was also the first to introduce 0603 and 0805 wirewound chip inductors.

These parts measure just .047" x .025" x .024" high (1.19 x 0.64 x 0.61 mm). Their top is encapsulated to provide a smooth surface for reliable pick and place handling. Twenty one part numbers cover the inductance range from 1 to 40 nH with available tolerances of + 5% or 10%.

The performance of Coilcraft's wirewound 0402 inductors significantly surpasses that of non-wirewound alternatives. For example, a 2.2 nH Coilcraft part has a Q factor of 100 at 1.8 GHz while 43 is the highest Q published by competitors at the same frequency. Because of their low DC resistance, Coilcraft chips can handle 200% to 300% more current than non-wirewound 0402 inductors.

Coilcraft

TRI COMPONENTS P/L

Check our website, and designers can call for an evaluation sample.

www.tricomponents.com.au Tel 03) 9560 2112

Does your network notwork?

Around 80% of network problems are due to faulty cabling - either shorted or open conductors, or miswired plugs if you are making up your own cables. These are absolute murder to find without the right tools (ever tried to check a network cable with a multimeter?), and so if you do a lot of wiring a network cable tester is a good idea.

BY GRAHAM CATTLEY

Good ol' blue-wire network cable. It seems as though the world is tied together with it, both literally and figuratively. But shorts between conductors, broken lines and even miswired plugs are difficult to find, and the temptation is usually to replace a suspect lead without question, just because it is to difficult to test.

The LAN Cable Tester from Altronics Distributors lives up to its name quite well, in that its only function in life is to test LAN cables. We aren't talking complex impedance/reflection or excessive crosstalk testing here — just simple continuity and wire transposition problems. It is capable of testing the usual 10Base-T and 10Base-2 LAN cabling, terminated in either RJ45 or RJ11 modular connectors. It can even handle any BNC-style coaxial cables used in networks — or anywhere else for that matter — by using the supplied adapter leads.

Operation is pretty straightforward: plug both ends of the suspect cable into the tester, and keep pressing the test button to check each conductor in turn. Continuity is indicated by two rows of LEDs, with each row having one LED for each line in the cable. As you cycle through each of the conductors in the cable, you can see the line being tested on one row of LEDs, and the pin it is connected to on the other.

It is a simple and straightforward system, and one that quickly highlights miswired, open or shorted cables. As well as this manual mode, the tester also provides an automatic mode, whereby the tester will cycle through all eight lines, and stop if it encounters a fault. A nice idea, but it only really means that you press a button once instead of eight times in a row — which is no big deal, particularly as in automatic mode the tester doesn't cycle once it reaches the eighth conductor.

If you can't get to both ends of your suspect wiring at the same time, you can use the little remote terminator unit to monitor one end of the cable, while the tester on the other end cycles through each conductor in turn. Again, a nice idea, but it would be nice if the tester were to continuously cycle though the lines, rather that running through it once and then stopping. This means that you need either very good eyesight in order to view the LEDs on the remote terminator, or another person to press the start button when required.

All up, I'd have to say that the LAN tester does what it does very well. It would be nice if there were a few more functions to help home in on the subtle faults that can occur (such as excessive crosstalk, or incorrect termination), but if you are after the most common faults, this tester certainly does the job.❖

Professional LAN Cable Tester

Good points: *Accepts RJ45, RJ11 and BNC cables*
Bad points: *Limited degree of testing.*
RRP: *$169*
Available: *Altronics Distributors, 174 Roe St., Perth, WA 6000. Phone: (08) 9328 1599, or free-call 1-800 999 007.*
Website: ***http://www.altronics.com.au.***

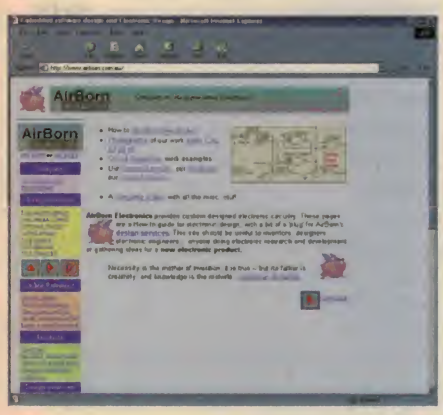
Webwatch

BY GRAHAM CATTLEY

Due to popular request, I've collated a list of all the sites ever covered in Webwatch, and it is available for download from our web site in the Internet files section. You can save the file on your own system, and use it as a handy reference, and download the update every month. And if you know of any sites that you feel deserve a mention in Webwatch, drop me a line at gcattley@fpc.com.au, and I'll be happy to include them in an upcoming column.

SO, YOU'VE COME UP with a great circuit design, and you're thinking of going commercial with it. What's involved in getting a prototype made? Do you need beta testing? What about documentation and all the other important details that you need to look at before your design hits the street?

www.airborn.com.au have just about all the answers, with detailed pages covering initial circuit design, firmware, and (to a somewhat larger degree) PCB design and manufacture. You'll find details on PCB manufacture, with some photos of boards being drilled, tinned and populated, as well as details on some small demo projects that explain the processes involved in getting a design to a marketable stage.



The Airborn site is a bit of a plug for their own services, as you would expect, but this site offers a lot of good advice to anyone thinking of getting their design off the workbench and into the market. It is also an Australian company (based in Sydney), which is good to see...

IF YOU FIND PICs a bit baffling, go to **http://come.to/thepicarchive** (go to, come.to? geddit?) and all will be revealed. Well, maybe not *everything*, but it's a pretty good place to start if you are looking for PIC info.

After a bit of a rummage around on this site I managed to pick (pick! PIC! Ha ha) up part 1 of the PIC Beginner's Guide, full data sheets for some of the more popular PICs, and a whole load of links to other web-based PIC resources, including David Tait's PIC Archive, which is no longer on the web (except for this mirror, of course). Oh, and sorry about the jokes - it's just too much coffee...

I DON'T USUALLY (in fact I don't think that I've ever) presented a reader's letter in Webwatch, but I think the following explains everything pretty well:

I really appreciated your June 1999 Webwatch 'Nicks Pinouts Collection' and got much good info downloaded from the site.

I wrote to Jeff Grover, MD of Dick Smith Electronics, congratulating him on an excellent 1999/2000 catalogue. In reply to my query about TDA series semiconductors, he kindly replied by letter (isn't it so wonderful when the MD takes the trouble to reply — well done DSE!) and suggested that I would find what I needed on ST's website at ***www.st.com****.*

As I frequently need info on monolithic IC Pentawatt (5 pin!) amplifiers, I promptly downloaded, TDA2040 (20W), TDA2050 (32W), TDA2051 (40W), and TDA2052 (60W) from the ST Microelectronics (used to be SGS-Thompson) site; all as PDF files that print beautifully on my cheap Canon BJC255SP printer. If you haven't already told readers about ***www.st.com*** *it is a beaut site.*

Keep up the good work, Robert Gott.

Well, I don't think that I can improve on that, so take a look and see what you think.

AND TO CONTINUE along the theme of reader-suggested sites, David Marriott suggests that you take a look at **setiathome.ssl.berkeley.edu**, which is the home page of SETI@home. To quote from their home page: "SETI@home is a scientific experiment that harnesses the power of hundreds of thousands of Internet-connected computers in the Search for Extraterrestrial Intelligence (SETI). You can participate by running a free program that downloads and analyzes radio telescope data. There's a small but captivating possibility that your computer will detect the faint murmur of a civilization beyond Earth."

Yup, link your computer into the global network and you could help find aliens... I've covered SETI's main site before in Webwatch, but not SETI@home, which gives you everything you need to help track down extra-terrestrial life.

Okay, it isn't an electronics site and it shouldn't really appear in Webwatch, but I've been told that transistors were developed from alien technology, so I suppose that justifies it...

JOHN LOADSMAN is a good friend of Webwatch (and EA in general, come to that), and he's come across the Analog Music Zone (**www.muzique.com/amz/index.html**) which he feels would be of interest to Webwatch readers. I'm inclined to agree — the site is packed full of stuff on analogue music, including circuits and full construction details on a wide variety of electronic musical equipment. There's buffers, boosters, fuzz boxes, switch boxes, tube amps — you name it.

There's also software (including a couple of PC-oscilloscopes), tips, techniques, and even a BBS-style message board if you want to ask (or answer) a question of another analogue music enthusiast.

And if you intend to venture into the wild wired weird world of setting up a band, you'll need a name, won't you? Have a quick perusal of the list of 'interesting' band names you'll find on the site while you're there.❖

EA Directory of Suppliers

Which of our many advertisers are most likely to be able to sell you that special component, instrument, kit or tool? It's not always easy to decide, because they can't advertise all of their product lines each month. Also, some are wholesalers and don't sell to the public. The table below is published as a special service to EA readers, as a guide to the main products sold by our retail advertisers. For address information see the advertisements in this or other recent issues.

Supplier	State	A	B	C	D	E	F	G
Altronics	WA	•	•	•	•	•	•	•
Dick Smith Electronics	ALL	•	•	•	•	•	•	•
Emona Instruments	NSW						•	
Jaycar Electronics	ALL	•	•	•	•	•	•	•
Oatley Electronics	Eastern	•			•	•		
Obiat	NSW						•	
RCS Radio	NSW			•				
Scientific Devices	VIC						•	

KEY TO CODING

A	Kits and modules	D	Components
B	Tools	E	IC chips and semiconductors
C	PC boards and supplies	F	Test and measuring instruments
		G	Reference books

Note that the above list is based on our understanding of the products sold by the firms concerned. If there are any errors or omissions, please let us know.

Electronics Australia Reader Services

SUBSCRIPTIONS: All subscription enquiries should be directed to: Subscriptions Department, FPC Magazines, PO Box 199, Alexandria 1435; phone (02) 9353 9992 or 1300 656 933.

BACK ISSUES: Available only until stocks are exhausted. Price A$7.50 which includes postage within Australia only. **OVERSEAS READERS SHOULD ADD A FURTHER A$2.50 FOR EVERY BACK ISSUE REQUIRED.**

PHOTOCOPIES: When back issues are exhausted, photocopies of articles can be supplied. Price $7.50 per project or $15 where a project spreads over several issues.

PCB PATTERNS: High contrast, actual size transparencies for PCBs and front panels are available. Price is $5 for boards up to 100sq.cm, $10 for larger boards. Please specify negatives or positives.

PROJECT QUERIES: Advice on projects is limited to postal correspondence only and to projects less than five years old. Price $7.50. Please note that we cannot undertake special research or advise on project modifications. **Members of our technical staff are not available to discuss technical problems by telephone.**

OTHER QUERIES: Technical queries outside the scope of 'Replies by Post', or submitted without fee, may be answered in the 'Information Centre' pages at the discretion of the Editor.

READER SERVICES BULLETIN BOARD: (02) 9353 0627; ANSI, 24 hour access; any rate to 28.8kb/s.

PAYMENT: Must be negotiable in Australia and payable to Electronics Australia. Send cheque, money order or credit card number (American Express, Bankcard, Mastercard or Visa card), name and address (see form).

ADDRESS: Send all correspondence to: Reader Services Co-Ordinator, Electronics Australia, P.O. Box 199, Alexandria NSW 1435; phone (02) 9353 0620. (E-mail to elt@fpc.com.au)

PLEASE NOTE THAT WE ARE UNABLE TO SUPPLY BACK ISSUES, PHOTOCOPIES OR PCB ARTWORK OVER THE COUNTER.

Name:.....

Address:.....

.....State:.....Postcode:.....

.....

Back issues:.....

.....

.....

Photocopies:.....

.....

.....

Amount: A$.....

Signature:.....(Unsigned orders cannot be accepted.)

Method of Payment: (Please circle correct method.) Credit card / Cheque / Money order.

Credit cards accepted:

Mastercard, American Express, Visa Bankcard (please circle applicable card).

Expiry date:.....

....

ADVERTISING INDEX

This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.

Basic Electronics

by Peter Phillips

An all new and up-to-date edition, providing an easy to read introduction to electronics for students and hobbyists. It even includes some simple DIY projects, to let you 'learn by doing it'!

On sale now at your newsagent for only $5.95, or by mail order from EA Reader Services (PO Box 199, Alexandria 1435) for $6.95 including postage and handling.

An Electronics Australia Publication

LOOK AT THIS

NEW AUS. IEC MAINS LEADS $2
NEW USA IEC MAINS LEADS $2

NEW SUPER LOW PRICE + LASER AUTOMATIC LASER LIGHT SHOW KIT: MKIII. Automatically changes every 5 - 60 secs. Countless great displays from single to multiple flowers, collapsing circles, rotating single and multiple ellipses, stars, etc. Easy mirror alignment with "Allen Key". Kit inc. PCB, all on board components, three small DC motors, mirrors, precision adjustable mirror mounts: (K115) + very bright 650nM laser (LM2) module. Kit with laser module $60 Kit + laser module + plug-pack + instument style case all at a special price of $75

$60

MOBILE PHONE ANTENNA

This antenna kit includes 4 meter terminated coaxial cable and external capasitively coupled on glass antenna Complete installation kit with glass cleaner. 340mm long. $8

12V Automotive Relays with 30A SPDT Contacts (73 ohm relay coil). RRP $7. our price $4 ea. 4 for $12

*****NEW***WHITE LED 5mm 3500mcd. Very bright Ideal for mini torch etc.... $4**

*****NEW*** 35-140 LED IRILLUMINATOR KIT**

Comes on in the dark or can be controlled by alarm system. Kit includes mount ing tray & universal swivel mount.35 LEDs $29. Extra 35 LED pack (3extra packs max) $16 per pack. 140 LEDkit:$67 Ideal for use with our B/W cameras to see in the dark.

$29

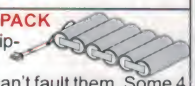
KEY-CHAIN LASER POINTER in a presentation box. Quality metal housing + 3X LR44 /AG13 bats. **FREE.** Extra bats. 50c Ea

$10

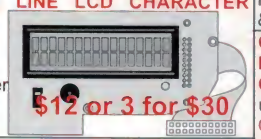
Line lens+$0.80...X-hair lens +$0.80...Module (no case) only $8

NICAD BATTERY PACK

Removed from equipment for routine maintenance. We can't fault them. Some 4 some 6 cell. $0.20 / cell. Guaranteed! **CHARGER PCB** (to suit above 6 cell packs) 7.2V trickle charger add $5



16 X 2 LINE LCD CHARACTER DISPLAY + 1M IDC ext. cable, LED, buzzer & switch on a PCB.



$12 or 3 for $30

TWO MOTOR LASER LIGHTSHOW KIT Inc. motors, mirrors, reversing switch & all electronic components. Can be controlled by variable DC input. Lots of patterns, flowers, stars etc. $16 **Laser module $8**

USED AUSSIE MADE TRANSFORMER 240V PRIMARY (120+120),ES screen, Secondary....1X12V@1.1A...10V@5A...7V@ 5A... 12-0-12V@7.5A. 100 X 115 X 100mm. bargain at $15

TOLL FREE PHONE NUMBER

Sorry but we don't have one but if you call **02-95843564** 24hrs & leave a message & your number we will call you back ASAP at our cost. **(ORDERS ONLY)**

OATLEY ELECTRONICS
ACN 068 740 081
PO Box 89 Oatley NSW 2223
Ph (02) 9584 3563 Fax 9584 3561
orders by e-mail: oatley@world.net
www.oatleyelectronics.com
major cards with ph. & fax orders,
Post & Pack typically $6
Prices subject to change without notice

Oatley Electronics Shop Open Fridays 1pm-4:30pm & Saturdays 10am-4pm during Sep. & Oct. as a trial. On sale will be surplus & special sale items only. All regular advertised, catalogue stock & kits must be ordered in advance by Phone, Fax or E-mail & can be paid for & picked up at the shop.

200A RADIO CONTROL MODEL SPEED CONTROL KIT

This kit is designed to work direct from a STD 1-2ms pulse from a R/C receiver to control an electric motor (in one direction only). Kit includes PCB + all on-board components inc. 6 high power MOS-FETs, a wiring kit and fuse holder & 26 x 64 x 38mm case. Coming soon for less than $35

< $35

Did you miss our JUNE SALE!!! ? Well you were not the only one!!! So we are going to run it again as the Much **BIGGER** September Sale. To see just what's on sale just check out the September Sale link on our new web page or if you have a polling fax you can see our text list of sale items on **02 95707910**. But don't forget our web page **BARGAIN CORNER** where we sell all of our regular specials like run out end of stock & special one or few of items like A portable medical X-Ray machine for $1500.

OVER $100,000 WORTH OF OFFICE SUPPLIES FOR ABOUT 1/4 OF RETAIL. Folders, binders, directory boards + lettering, cork boards, white boards large & small, fabric boards, bulletin boards, notice boards, instant signs, desk signs, flip charts + easels and more, Mostly quality Quartet brand products. Sale to be held on our web site 14 Oct. & at a location to be announced on 15 &16 Oct. in the Peakhurst / Mortdale area. Do your company / school a favour & tell your Purchasing Officer NOW!!!

NEW ULTRA-SONIC RADAR KIT

Just like top European cars you can fit a reversing radar that will sound a buzzer or flash a light on your dash to tell you when your car is near another car or object. Inc. adjustable range up to 1M out put to drive relay or buzzer. kit includes PCB plus all on-board components including Ultra-sonic transducers & buzzer for $18

PELTIER EFFECT DEVICES.

Could be used for cooling overclocked PC CPUs. All 40 X 40mm.
4A △ T 65deg. Qmax 42W $25
6A △ T 65deg. Qmax 60W $27.50
8A △ T 65deg. Qmax 75W $30
Comes with info to build cooler / heater plus data. Some used heatsinks avail.

NEW MOSFET STEPPER DRIVER

This kit is designed to work below 5V & greater than 35V (higher voltage MOSFETS avail.)Very efficient (very little heat) & work with software like DANCAD etc.(for step/dir-ection signals) & is ideal for CNC projects. It works well with the stepper motors in our famous German printer $45 or$35 with new or previous printer purchase

NEW...PC MOTHERBOARD

UMC-486 CACHE ISA SX 40Mhz. Original package, **486-40Mhz CPU,** book inc..., 5 X 16 bit & 1 X 8 bit slots, 4 X 30 pin & 1 X 72 pin Mem. slots 220 X 170mm $18

GET YOURS BEFORE THEY ALL GO BUILD YOUR OWN COMPUTER CONTROLLED 2/3 AXIS MACHINE

using parts of our now famous $46 surplus GERMAN PRINTER & CNC shareware (DANCAD) The printer is full of steppers, toothed belts, pulleys, bearings etc (EA June 99). we have plans/notes for $9 (on floppy) & links to find lots of info on the net .

(NEW) 12V / 2.3Ah AUDIOVOX LEAD ACID BATTERY (Model BTR-1900). Priced at a fraction of their real value (as used in video cameras & older mobile phones - same as Panasonic batteries we sold before). 180 (L) x 60 (H) x 22 (W) mm, 0.67Kg, made in Japan. The contacts (which are easily solderable) are at one end of the battery. 2 batteries + suitable 500mA float charger.

$20

CFL INVERTER

This is our extremely popular inverter kit. The new improved design uses a larger transformer and a SG3525 switch Mode Chip.This very Efficient Driver kit can drive a number of CFL's from 12vdc. And would be great for lighting the weekender or caravan Kit inc. 1 inverter & 1 CFL: $35 Extra CFLs $13

240-110 ISOLATION TRANSFORMERS

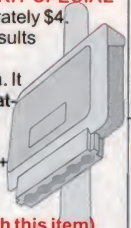
500 VA, COMPACT METAL CASE, FUSED, MAINS LEAD. ONLY$80

SOLAR PANELS ARE BACK

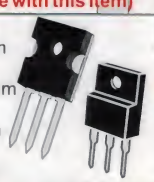
Quality SEIMENS brand Polycrystalline cells. Voc Isc 1W output. 4 panels req. to charge 12V batteries. Specifications: Open circuit voltage: 5.7v...Short circuit current: 0.22A...Peak Power: 1.0W @ 100mW/ sq cm...Dimensions: 160mm x 55mm x 5mm...Flying lead: Dual cable 25cm long. Should be placed under glass for outdoor use.$10ea. or 4 for $36

MASTHEAD AMPLIFIER KIT SPECIAL

The MAR-6 available separately $4. The amplifier gives good results with any two metal wires or strips acting for the antenna. It should even work with a coat-hanger! Basic kit with both the PCBs & all on-board parts (K03) $15 ...Basic Kit + 2 Weather-proof Plastic Boxes + plug-pack: $24 (ask for your free case with this item)



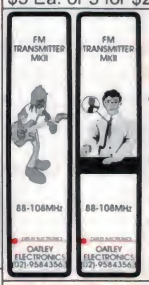
MOSFET BARGAINS



IRFZ-44...$2.50
60V/50A/0.028 ohm
IRF-540...$2.50
100V/28A/0.077 ohm
IRFP460...$5
500V/20A/0.27ohm
IRF-820...$2.50
500V/2.5A/3.0 ohm

NEW AUSTRALIAN PLUG PACKS AT BELOW WHOLESALE PRICES

GENERAL ELECTRIC 20VA 14VDC @ 700mA.
AUDIOVOX 9V @ 500mA
AUDIOVOX 12V @ 400mA....
$5 Ea. or 5 for $20



KIT SPECIAL

FM TRANSMITTER KIT / RADIO MIC. Has good range & stability & can be con-figured as a hand held mic, lapel mic or musical instrument transmitter. Kit includes PCB, all onboard component, suitable small case & lapel micro-phone with clip. just $19

XENON FLASH TUBES

Removed from disposable cameras. Just add a AA cel.

STROBE KIT

also available. uses above flash$6

$3 Ea. or 4 for $10

*****SUPER SPECIAL*****

BRAND NEW PACKARD BELL KEYBOARDS. Top quality Packard Bell computer keyboards for just $12 Ea.

We don't have enough space here for all of our kits. Most of our old kits are still active. Just check our web site to see our full range of kits & products.

***** FANTASTIC BARGAIN *** COMPUTER POWER SUPPLY PCB:**

New PCB assembly. Dimensions are 45 x 108 x 200mm. Switchable 120/230V AC input. DC outputs are +5V@ 6A,+ 12V @ 1A,-12V@1A,-5V@1A. Data Inc.RU approval. Mains input . Be Quick: (Ps6) . 4 for $24

*****NEW*****

PANAFLOW brand 80mm 12VDC FANS.

$3 Ea OR 4 FOR $10 coming soon

PRO PIC MICRO PROGRAMER

User up to 39 different types of PIC chips, Works under DOS, WIN 3.xx & WIN 95, Quick Easy construction, Connects to Pc's parallel port. Download fully functional evaluation software from the Internet register for a small fee. More details on our web page

$27

BASIC PIC MICRO PROGRAMER JUST

Learn program your own 16F83 /16F84 /16C84 micro-controllers the easy way with this simple kit that just plugs in to your Pc's . Kit inc. program examples and notes PCBs, all on-board components, Db25 connector & a PIC chip ready to program. Software available free to Download From our web page

$32

*****NEW***NEW***NEW*****

DING DONG DOOR BELL KIT

Kit inc. Chip on-board type PCB plus speaker, push button, Battery holder, enough wire up to run 24 Meters & new surplus case. Ideal for commercial or domestic extension bell $11

UHF AUDIO / VIDEO TRANSMITTER KIT

Kit includes all components needed..... PCB plus all on-board components, connectors, switch, metal case, telescopic antenna, twin RCA A/V lead, all that is needed to complete the full kit. 12Vdc @10mA operation. Ideal for transmitting audio and video around you home.. Complete Kit for just $28

suitable plugcack $5

AT LAST! A COLOUR CMOS CAMERA WITH GOOD RESOLUTION + BUILT IN AUDIO + FREE PLUG PACK + FREE VHF MODULATOR.

Available with swivel mount or dome mount housing.

$160
No Audio

$160

BNC connector (video), DC connector (power), RCA connector (audio). 330000 pixel. 330 TV line res. 7-12Vdc 55mA max. INTRO PRICE $160

**** CCD CAMERA SPECIAL ** WITH A FREE VHF MODULATOR**

The best "value for money" CCD camera on the market! 0.1 lux, High IR response & hi-res. Better than most cheaper models. **32 X 32mm $105...** With 1of these lenses pinhole (60deg.), 92 deg.; 120 deg. or for (150 deg) add $10

EA_OCT_99

OLYMPUS®

CAMEDIA C-2000 ZOOM

The new era of Digital Creativity

The stunning new Camedia C-2000 ZOOM sets new standards in digital cameras with 2.1 million pixels and a super-sharp 3x zoom lens. Ultra small yet big on performance the C-2000 was designed with the photographer in mind, with a range of advanced features that cover all the options from quick shooting to artistic expression.

- 1/2" CCD with 2.1 million pixels (1,600 x 1,200)
- 3x f2.0 zoom lens (equiv.to 35-105mm)
- Five shooting resolutions, including uncompressed mode
- Digital ESP metering plus Spot Mode
- Program, Aperture-Priority and Shutter-Priority modes
- Multi-Mode flash with First or Second Curtain sync
- Standard PC flash sync socket
- Selectable ISO 100, 200 or 400 sensitivity
- Manual exposure compensation +/- 2 steps
- 1.6x, 2x and 2.5x Digital Tele Modes
- Uses SmartMedia cards up to 32MB (8MB supplied)
- Quick shooting and 2fps Sequence mode
- 4.5cm LCD screen and optical viewfinder
- PAL video output
- RM-1 Remote control supplied
- Optional tele, wide & macro conversion lenses (Adaptor required)

The Olympus C-2000 ZOOM - now you can get serious about digital photography.

For further information on the C-2000 Zoom and location of your nearest Olympus Digital Stockist.

R. GUNZ (PHOTOGRAPHIC) PTY LTD, P.O. Box 690, Beaconsfield NSW 2014 EMAIL: gunzmail@gunzphoto.com.au

SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
Ph: (02) 9935 6600	Ph: (03) 9429 4555	Ph: (07) 3252 2832	Ph: (08) 8363 2866	Ph: (08) 9444 7177
Fax: (02) 9935 6622	Fax: (03) 9427 0360	Fax: (07) 3252 4624	Fax: (08) 8363 2830	Fax: (08) 9443 3661